# FLEET OWNER

DEVOTED TO THE BETTER OPERATION AND MAINTENANCE OF ALL AUTOMOTIVE FLEETS

Vol. 34 February 1945 No. 2



ECHNOLOGY DEPT.

DETROIT

## The Miracle of Meat

● Of all our chief perishable foods, meat has to travel the farthest to reach most dinner tables. The miracle of meat is the industry's distribution system which brings it . . . fresh, nutritious and inexpensive . . . from ranches and farms, oftentimes two thousand miles and more away. Last year, 18-*billion* pounds of livestock—nearly two-thirds the total—came to market by motor truck. From here, other thousands of "refrigerators on wheels" complete the distribution cycle. As in so many industries in which dependable trucks are vital, Whites have long enjoyed preference among meat packers. And when trucks can again be freely bought, new *Super Power* Whites will provide greater dependability and economy than ever before.

**THE WHITE MOTOR CO. • Cleveland, Ohio, U. S. A.**

A larger volume of new Super Power Whites for commercial use is now assured for 1945 by government order. Your White representative will be glad to help you make application.

FOR MORE THAN 45 YEARS THE GREATEST NAME IN TRUCKS

White

# Double Life Principle

2. Then, after 5 to 10 thousand miles, inner ring contacts BOTH SECTIONS of a perfectly seated ring assembly
1. NO HARSH BREAK-IN
Only the highly graphitic cast-iron oil ring is initially contacted by the Inner Ring.

Copyright 1945 RAMSEY ACCESSORIES MFG. CORP. St. Louis, Mo.

*Another Engineering Reason Why You DO THE JOB RIGHT when you*

## RE-POWER with RAMCO 10 up

### Heavy Duty All-Purpose Piston Rings

**For years, tens of thousands of mechanics have been using Ramco 10-Ups as *All-Purpose* Rings. They've proven by billions of performance miles that Ramco 10-Ups are the right rings for any job . . . re-bore or re-ring.**

**That's because Ramco 10-Up rings are engineered to function as all-purpose rings; embody such Ramco achievements as the Double Life Principle illustrated here. Write for a free copy of "Ramco's Long Life Principle".**

**Ramsey Accessories Mfg. Corp., 3713 Forest Park Blvd., St. Louis 8, Mo. Factories at St. Louis, Mo.; Fruitport, Mich.; Windsor, Ontario.**

*In war or peace*

**B.F.Goodrich**

**FIRST IN RUBBER**

# The tire with the built-in rock absorber

## *A typical example of B. F. Goodrich development in rubber*

TRUCKS like this one move and dump ten and twelve-ton loads as easily and almost as quickly as you throw a shovelful of coal in the furnace.

But when one of these big tires hits a rock, it's a piledriver blow, a sharp impact with tons behind it. And rocks just can't be avoided in off-the-road service. Big four and five-foot tires are costly (the rear tires in the picture cost $650 apiece). Often, under impact, these tires bruised, blew out. This meant expensive delays, repairs or discarding the tire.

B. F. Goodrich engineers set to work, developed a new principle of tire construction, put a "rock absorber" under the tread to provide greater protection against bruising and blow-outs. Between the tread and the plies of the tire they put four breakers, layers of rubber-coated rayon cord fabric, insulated them with cushions of special shock-resisting rubber.

Under impact the cords in these breakers stretch and return to their original position, distributing the force of the blow and allowing it to be absorbed by the rubber between them. Thus the shock passed on to the cord body of the tire is greatly reduced.

Users say their records show B. F. Goodrich tires built this way often last twice as long. Repair bills are cut. Delays reduced.

This development is typical of those going on constantly at B. F. Goodrich. Developments which improve the service of tires for trucks, buses, passenger cars, airplanes, farm tractors, farm implements and industrial equipment. The B. F. Goodrich Company, Akron, Ohio.

**B.F. Goodrich**

**Truck & Bus Tires**

FLEET OWNER, February, 1945. Vol. 34, No. 2. Published monthly by the Ferguson Publishing Co., 90 West St., New York 6, N. Y. Subscription price $3.00 per year in the United States and Canada. Single copies 35¢. Acceptance under the act of June 5th, 1934, authorized April 24th, 1941.

# "Lightning"

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHT

# Delivery

LASHED together to form a strong, self-powered raft, two amphibious "ducks" quickly and efficiently transport a P-38 Lightning from ship to shore. This novel use of "ducks" for ferrying heavy cargo permits planes to be shipped overseas fully assembled, speeds their delivery to airbases in flying condition.

Trucks, like "ducks", are also carrying heavy cargoes these days . . . cargoes that call for efficient, full-power engine performance. To assure this, truck fleet operators everywhere use Texaco.

*Texaco D-303 Motor Oil,* for example, has the properties of detergency and dispersion. Detergency keeps piston rings and engine parts clean. Dispersion holds deposit-forming materials in suspension until normal drain periods. D-303 protects modern bearings and prevents scuffing of rings, pistons and cylinders.

For quieter-running, longer-lasting transmission and differential gears, use Texaco transmission and differential lubricants.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

## THEY PREFER TEXACO

* More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.
* More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.
* More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.
* More revenue airline miles in the U. S. are flown with Texaco than with any other brand.
* More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

TEXACO

LUBRICANTS AND FUELS

FOR THE TRUCKING INDUSTRY

METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

# *It's what goes on* INSIDE *that counts*

**Inside an engine, extra flat piston rings deliver important savings**

THE FLATTER the ring, the better the seal—and Pedrick rings are so flat that small 2-inch rings can be stacked 6 feet high without tottering, as shown in illustration. It is this kind of precision in each manufacturing operation that enables Pedrick rings to deliver important savings in fuel . . . more power . . . and longer wear.

Furthermore, Pedrick rings stay flat in spite of severe service conditions. Pedrick has developed an exclusive and patented Heat-Shaping process that relieves the stresses set up in the metal by machining operations. Each grain in the metal is set for ring life. There is no distortion or warping in service.

These are some of the reasons why Pedrick *precisioneered* piston rings deliver better performance *inside* an engine. Pedrick rings in compensating types for reconditioning truck and bus engines are supplied in *guaranteed* Engineered Sets. Call your nearest Pedrick jobber. WILKENING MANUFACTURING CO., Philadelphia 42, Pa. *In Canada:* Wilkening Manufacturing Co. (Canada), Ltd., Toronto.

Pedrick

*precisioneered* **PISTON RINGS**

**BUY WAR BONDS AND MORE BONDS**

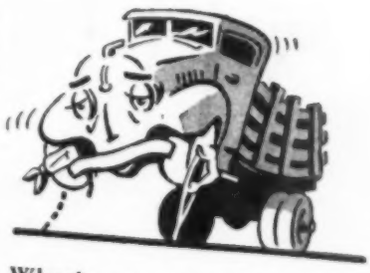
MILLER

"HEAVY SERVICE" TRUCK TIRES

# How to Get Extra Mileage Out of Synthetic Truck Tires

## *Watch Mechanical Defects*

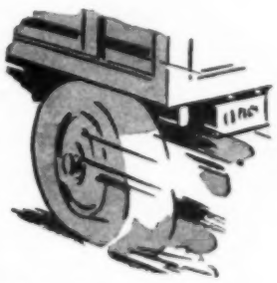
Today most trucks are driven harder and longer than they would be in peacetime. Many of them are beyond the age at which they normally would have been retired. Because of this even the best of them sometimes develop mechanical irregularities which shorten tire life.



Wheels get out of line, wobble as they roll, and thereby scuff away many a tire dollar. A tire on a wheel that's only half an inch out of line will drag sideways 87 feet every mile.

Too much toe-in or toe-out also wears tread extra fast, makes steering difficult and may even cause an accident.

Spotty or uneven tread wear may be caused by grabbing brakes, worn or loose bearings, worn bushings, loose steering connections, bent axles, or out-of-balance wheels.



**TIP:** At the first sign of excessive or uneven tread wear, have your truck checked for mechanical irregularities. Brakes should be tested and all mechanical parts which might affect tire wear should be inspected every 5000 miles. Don't speed. Don't overload.

### FREE *Hints on Tire Care*

Write for your copy of the 24-page illustrated booklet, "Truck Abuses and How to Prevent Them". Contains information your maintenance men can use every day. Write Miller Tires, Akron, Ohio, or Los Angeles, Calif.

# Do it right with SIOUX

**Perfected Dual Action**

## Valve Seat Grinder

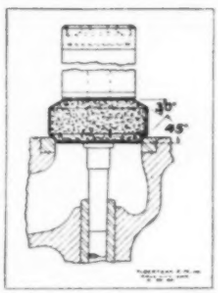
**with BALL-BEARING Holder**

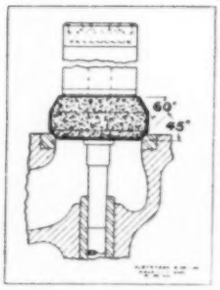
SIOUX offers the most accurate, fastest and smoothest method of grinding valve seats with a uniform fine finish all the way around. Grinds the hardest seats quickly. Perfected dual action provides a controlled fine vibration for grinding accuracy and dispersion of cuttings—wheel mounted for full valve seat contact.

For absolutely correct alignment, use SIOUX Tapered or Tapered Expanding Pilots.

**ASK YOUR JOBBER'S SALESMAN**

### SIOUX Valve Seat Grinding Wheels Offer Double Service




They come in 45° or 30° and are reversible on the Holder. If one side becomes worn, the grinding wheel can be turned over and dressed down to the required angle on the other side. The 45° wheel can be turned over and dressed to 30° or 60° on the dressing tool—providing for top cut and inside narrowing or for 30° seats without buying extra grinding wheels.

**STANDARD THE WORLD OVER**

**ALBERTSON & CO., INC. SIOUX CITY, IOWA, U. S. A.**

# FROM THE STRATOSPHERE . . . BETTER SPARK PLUGS

## FOR

# BUSES AND TRUCKS!

For more than four years past, Champion Ceramic Aircraft Spark Plugs have been on active duty with our air forces, setting new records for long life and dependability. Extreme altitudes, extreme temperatures, 100 octane gas, and supercharging plus operating conditions in the high output engines themselves required new and revolutionary spark plugs, embodying materials and precision craftsmanship of an exceptionally high order. Today those same basic materials, fundamental design and exceptionally high manufacturing standards are yours, in Champion Spark Plugs, for individual buses, trucks, or fleets. Naturally, Champions bring an extra measure of dependability and efficiency to every engine. Champion Spark Plug Company, Toledo 1, Ohio.

DEPENDABLE

# CHAMPION

## SPARK PLUGS

Buy More and More War Bonds Until the Day of Victory

## Lengthen Tire Life By Using This Preventive Maintenance Tip

In your search for ways and means to save precious rubber and to get those *extra* miles from your tires, are you using this important preventive maintenance measure: ***guarding tires against contamination with oil and grease accumulations on garage floors and pits?***

Unless your floors are free of grease and oil, your tires will deteriorate . . . their mileage expectancy reduced. So PLAY SAFE—by keeping floors thoroughly clean with

## OAKITE PENETRANT

This unusually effective emulsifying, penetrating washing material makes quick work of removing grease, oil, muck and dirt. All you do is (1) wet down the floor with Oakite Penetrant solution; (2) let it soak for a few minutes; (3) give it a light brushing, then a rinse leaves the floor clean, free of unsightly and harmful grease and oil—and good as new!

For complete details, send for helpful booklet. It contains other shortcuts for CLEANING MOTORS and CHASSIS . . . RECONDITIONING RADIATORS . . . CLEANING COOLING SYSTEMS . . . and EXPEDITING REPAIR WORK. Write today for your FREE Copy!

**OAKITE PRODUCTS, INC., 52G Thames St., NEW YORK 6, N. Y.**

*Technical Service Representatives in All Principal Cities of the United States and Canada*

**OAKITE** *Specialized* **CLEANING**

MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT



# FLEET OWNER

Charter CCA Member

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PUBLISHED MONTHLY IN THE INTERESTS OF AUTOMOTIVE FLEET OWNERS WHO DO ALL OR PART OF THEIR OWN SERVICE WORK, AND DEVOTED TO THE BETTER OPERATION AND MAINTENANCE OF TRUCK, BUS, TAXICAB, CAR AND ALL AUTOMOTIVE FLEETS BY

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NBP ASSOCIATION



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# Whatever you call it...

# detergency dispersancy or peptizing action

## Stanolube HD has that quality which keeps engines clean

THE QUALITY in a truly HD (heavy-duty) motor oil that keeps engines clean has been given many names—detergency, dispersancy, or peptizing action are some. Regardless of the name you give it, *what* that quality is, and *why* it keeps engines clean, are of utmost importance to you.

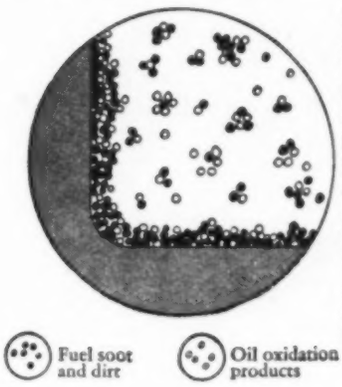
A simplified description at the right explains the difference between conventional, oxidation-inhibited motor oil, and those that have *both* added oxidation inhibiting and detergency or dispersancy properties—such as Stanolube HD. It explains why Stanolube HD keeps engines free from varnish and other engine deposits even under severe service demands.

You can get much more positive and convincing proof of the advantages of Stanolube HD by testing it on some of the hard-worked engines in your fleet. A Standard Oil Automotive Engineer will be glad to help you make such a test or show you actual fleets—perhaps near you—where Stanolube HD has provided clean engine operation when other oils have failed.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Automotive Engineer nearest you.

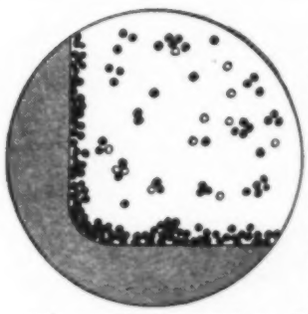
**Cause of Engine Deposits** Most troublesome engine deposits are caused by: (1) Fuel soot which originates in the combustion chamber and dust that enters the engine. (2) Oil deterioration products caused by excessive heat and agitation of the oil in the presence of oxygen. Both types of contaminants tend to accumulate more rapidly under heavy-duty service than in normal operation.

### Why deposits occur in conventional oil



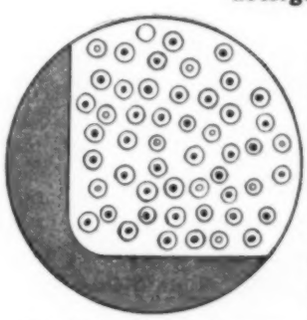

The first diagram shows how these typical contaminants are theoretically present in a used conventional oil. They have a tendency to adhere to each other and settle out of the oil, depositing on engine surfaces such as crankcases, pistons, oil screens, oil lines, and bearings.

### An oxidation-inhibited oil gives only partial protection



The second diagram shows how oils appear with improved oxidation stability *only*. Oxidized oil particles are materially reduced. As a result, deposits are less heavy on engine surfaces. However, this does not prevent dust, fuel soot, and the remaining oxidation products from depositing in the engine.

### Effect of an oxidation inhibitor plus a detergent in Stanolube HD

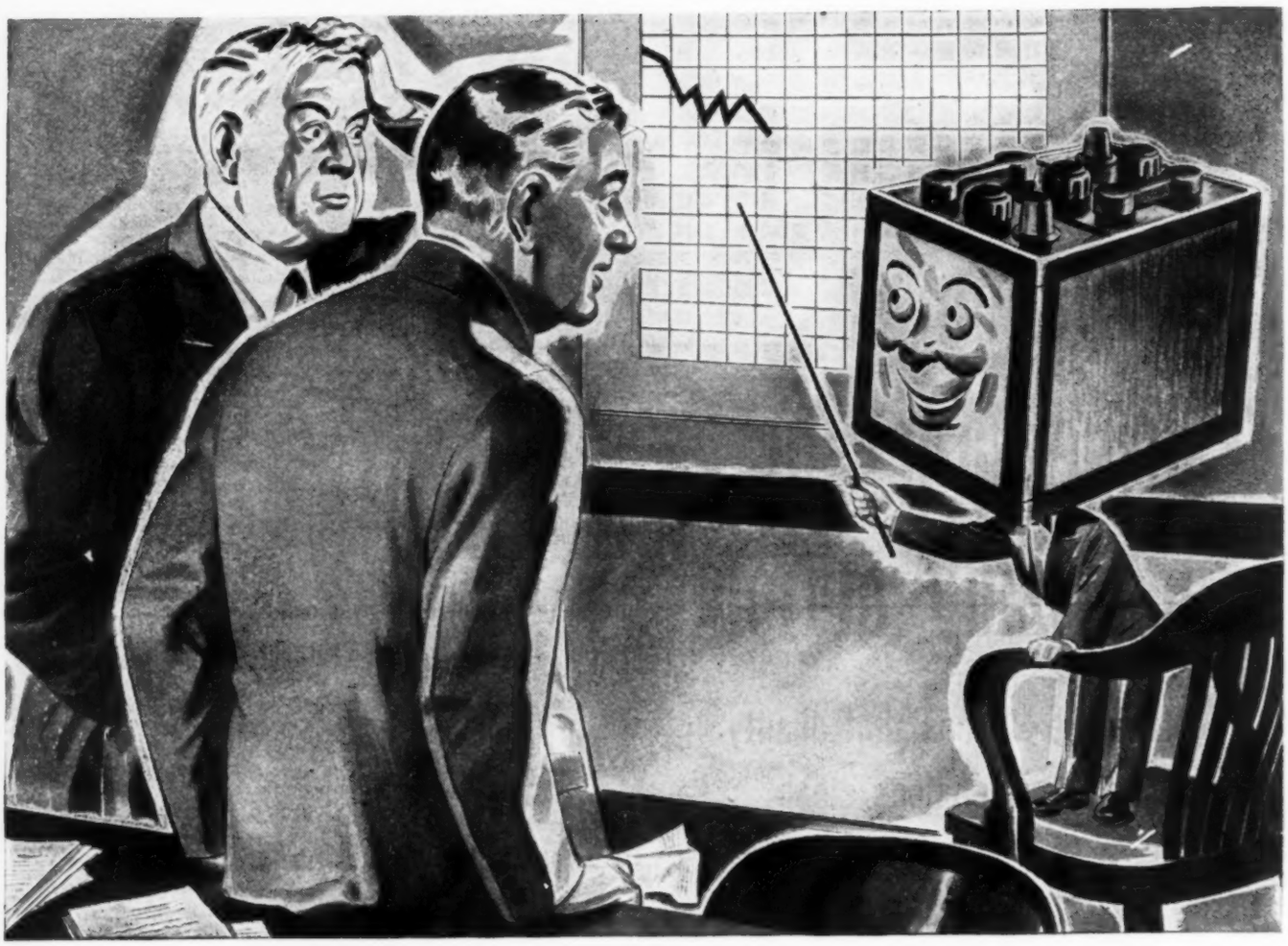


In order to render harmless *all* potential deposit-forming contaminants, Stanolube HD contains a combination oxidation inhibitor and detergent additive. The third diagram illustrates how the detergent theoretically surrounds all of the contaminants in the oil, including the small amount of oxidized oil present, with a film which prevents them from adhering to each other or to interior engine surface. It holds them in suspension in the oil until they are removed by filtering or draining, thereby eliminating troublesome deposits. A true heavy-duty oil has both detergency and oxidation stability.

*Gasoline Powers the Attack . . . Don't Waste a Drop!*

**STANDARD OIL COMPANY (INDIANA)** STANDARD SERVICE

★ FLEET CONSERVATION SERVICE



# Mr. Hi-Q Helps Bolster Sagging Operations Curve

***Mr. Hi-Q:*** Such faces, gentlemen! Come! Come! Things can't be as bad as that.

***Fleet Manager:*** They're certainly not good . . . and they're getting worse. This winter weather is sure messing up our operations.

***Mr. Hi-Q:*** If batteries have been one of your problems . . .

***Fleet Manager:*** They definitely have!

***Mr. Hi-Q:*** Why not start standardizing on *your manufacturer's top-of-the-line batteries?* They stand up better, last longer, and many fleet operators maintain that they cost less per mile in the long run.

***Fleet Manager:*** Are they really so much better?

***Mr. Hi-Q:*** Well, they have stronger plates, better separators, heavier cases, and most manufacturers equip their best batteries with Fiberglas* Retainer Mats.

***Fleet Manager:*** And what do *they* do?

***Mr. Hi-Q:*** Standard tests show that they greatly reduce battery failures formerly traceable to shedding of power-producing material from the positive plates.

***Fleet Manager:*** Sounds interesting!

***Mr. Hi-Q:*** These same tests show that batteries equipped with Fiberglas Mats last up to twice as long as the same batteries without the mats.

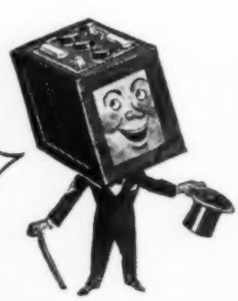
***Fleet Manager:*** Did you say "twice as long"? That would be something.

***Mr. Hi-Q:*** Suppose you ask your battery distributor about these better batteries . . . and be sure to mention that you want them Fiberglas-equipped.

*Owens-Corning Fiberglas Corporation, 1962 Nicholas Building, Toledo 1, Ohio. In Canada, Fiberglas Canada Ltd., Oshawa, Ontario.*

ARMY E NAVY

YOU CAN'T FIND A BETTER BUY THAN THE BEST BATTERIES— FIBERGLAS-EQUIPPED



# FIBERGLAS

*T. M. Reg. U. S. Pat. Off.

## BATTERY RETAINER MATS

# More Ford trucks on the road

# On more jobs

# For more good reasons !

TRUCK-ENGINEERED

**FORD TRUCKS**
**AND COMMERCIAL CARS**

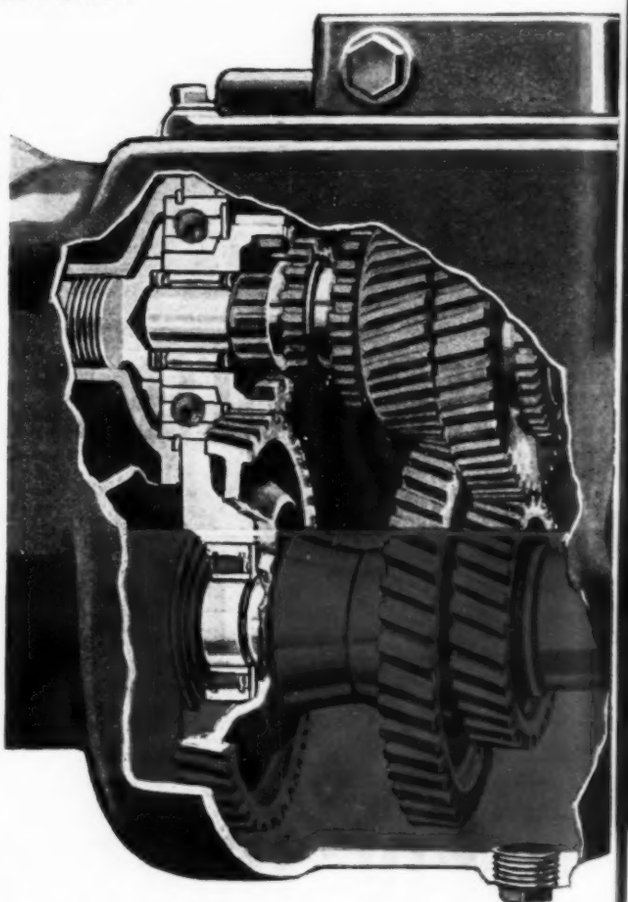
**TRUCK-ENGINEERED AND TRUCK-BUILT BY TRUCK MEN**

# MAKE LIFE

## *For War-Rushed*

**CUT YOUR GEAR MAINTENANCE COSTS**

Today, repairs cost you so much—in revenue miles, in scarce and precious maintenance manhours—that you just can't afford *not* to give your equipment the finest possible lubrication.



**MINIMIZE WEAR, DEPOSITS, GEAR FAILURES!**

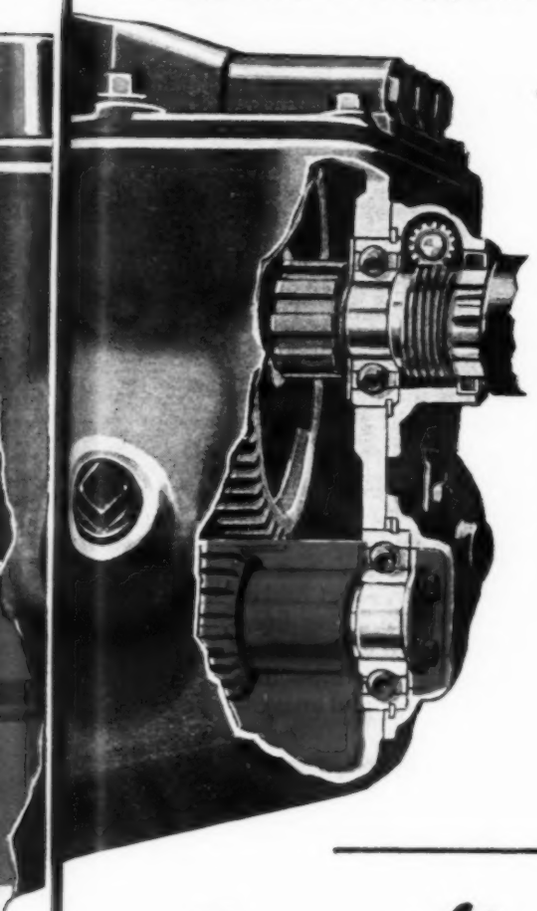
**Mobilube Gear Oils are exceptionally stable straight mineral oils—*developed to meet the toughest heavy-duty requirements!* Free of abrasives, soaps, fillers and other foreign materials. Give you *quality* protection!**

# MOBILUBE

# EASIER

## Maintenance Men!

Mobilube Gear Oil is just one of the fine Socony-Vacuum products which *prevent trouble—keep equipment on the job.* See your Socony-Vacuum Representative for complete and *scientific* protection of every part of every vehicle.



**MEAN EASIER SHIFTING!**

**When used in correct grades, Mobilube Gear Oils remain free-flowing in zero weather —prevent shifting difficulties, reduce wasteful "oil-drag"!**

# FACTS

### From Your Socony Vacuum Representative

This man puts Socony-Vacuum's vast experience and resources *to work for you.* He not only brings you outstanding products . . . but expert engineering aid and other important helps.

**REDUCE ENGINE MAINTENANCE**

with Delvac Heavy-Duty Oils. These highly stable engine oils not only provide outstanding protection against wear . . . they have special detergent properties which minimize sludge, gum and "varnish" formation—*reduce the frequency of engine cleanings!* Also help prevent corrosion of hard-alloy bearings!

**CUT CHASSIS TROUBLES**

by using Mobilube Greases! This famous line of greases has been specially developed to meet the requirements of every piece of equipment you operate. Mobilube V is one of the best-known products in this line. Recommended for wheel bearings, grease-type universal joints, clutch release bearings and other parts subjected to high operating temperatures—this lubricant has proved its value in many fleets through outstanding performance in all types of service. It's recommended for year-around use!

**IMPORTANT HELP FOR MAINTENANCE DEPARTMENTS**

Your Socony-Vacuum Representative is now ready to bring you a completely new Preventive Maintenance Plan which not only works within the Maintenance Department—but enlists your drivers' active cooperation in the effort to cut down repairs—save money and valuable manhours.

A new booklet—a series of clearly written engineering bulletins—and big down-to-earth posters are included in the material you receive.

# *Gear Oils*

SOCONY-VACUUM

SOCONY-VACUUM OIL CO., INC. and Affiliates: Magnolia Petroleum Co., General Petroleum Corp. of California.

# Dayton Wheels

**KEEP GOOD COMPANY!**

**DAYTON WHEELS ARE USED ON**

## TRUCKS

Autocar Mack International Harvester
Gramm Federal Studebaker White

## TRAILERS

Freuhauf Trailmobile Gramm
Kingham Edwards Mono

## BUSES

Brill Mack Pullman

SINCE the very beginning of the heavy-duty truck and bus era, Dayton Spoke Type Cast Steel Wheels have been the standard of the industry. Over a period of 32 years these wheels have kept pace with the demands of changing conditions and are still the best.

Much stronger and more resilient, Dayton Wheels stand up under punishment longer. And with all their strength they are much lighter, saving the weight of an extra wheel.

Fanning action of the spokes sends a constant flow of cooling air on tires and brake drums, adding to tire and brake lining life. Demountable rim construction speeds tire changing and the increased pressure on the clamp bevel prevents rim slippage and uneven tire wear.

Specify Dayton Wheels for new equipment or replacements.

**The Dayton Steel Foundry Co., Dayton, Ohio**

★ *KEEP ON BUYING WAR BONDS!* ★

# Dayton SPOKE TYPE CAST STEEL Wheels

**Dayton Brake Drums**
Drums assembled to the wheels at the factory give more perfect concentricity.

**Dayton 5th Wheels**
Standard equipment on many trailers. Quick coupling. Positive operation.

**Dayton Landing Gears**
Made in both hydraulic and mechanical types.

# Facts and Flashes

From the
**ETHYL CORPORATION**
Chrysler Building, N.Y.C.

*Progressive fleet operators are still looking ahead*

You would not expect men who spend most of their waking hours struggling to keep a truck or bus fleet running under wartime conditions to pay much attention to the broad problems of the future. Yet progressive men in the field today show a definite interest in the possible post-war developments.

For example, more and more fleet men are beginning to realize the importance of the tremendous wartime development by the petroleum industry of high-octane aviation gasoline production. While this gasoline is used for military purposes, after the war much of the equipment used to produce it can readily be adapted for use in making higher quality civilian gasoline. So forward-looking fleet operators are asking, "How can we benefit from the higher octane gasoline that will undoubtedly be on the market shortly after the war?"

The answer is not a simple one. Operators must consider existing equipment as well as new vehicles. Because of the wide variation in types of equipment, this problem should be worked out in terms of the individual fleet. But, generally speaking, it seems that many engines can be adjusted to benefit from higher octane gasoline and that manufacturers may, in certain instances, recommend engine modifications at overhaul time.

Thus, the fleet operator will be able to work out a planned conversion to high-octane gasoline which will enable him to get maximum service from his existing equipment as he gradually acquires new units. In working out such a plan, the service departments of petroleum refiners and engine manufacturers will be glad to cooperate.

* * *

WARNINGS AGAINST PETROLEUM-BASE BRAKE FLUID have been issued by the Automobile Manufacturers' Association. The government recently sold a large surplus of this fluid, which was designed for use only in military aircraft. Some of this fluid may find its way into the hands of jobbers, dealers and service stations. While it is satisfactory in aircraft, should even a small amount of this petroleum oil be used in trucks, buses or automobiles, a swelling of the rubber cups in brake master cylinders and a deterioration of the flexible hose lines might result.

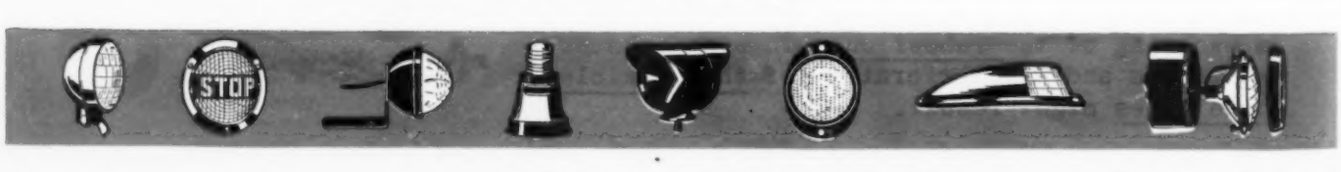
# Safety after dark

Long ago, when the bicycle was built for two and steady streams of cyclists pushed their way up and down Main Street, proper lighting contributed to safety after dark.

Today, proper lighting pays bigger dividends than ever. Equipment that costs many times as much as the smartest two-wheeler is at stake. Now, accident-tolls are measured in terms of lives instead of bumps and bruises.

Arrow lighting is proper lighting. Arrow Sealed Beam Headlamps, Marker Lights, Tail Lights, and other Arrow products are carefully designed to assure the greatest visibility and longest dependable service—and to conform with both state and I. C. C. regulations. Ask your jobber salesman for Arrow products or write direct for catalog. Arrow Safety Device Company, Mount Holly, New Jersey.

**FOR SAFETY ARROW AFTER DARK**



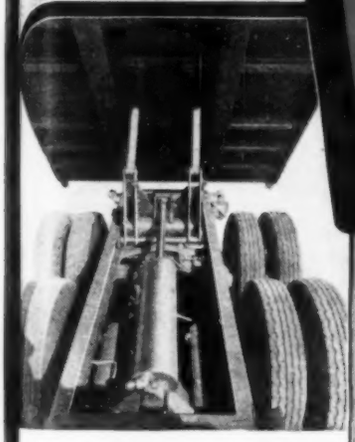
# New Heil arm type hoists operate smoothly... ...dump loads faster

## and save money on maintenance costs

The design of this new Heil arm-type hoist is the outgrowth of many years of exhaustive research. Many cams, rollers, and gears have been eliminated to give you simplicity of design—fewer parts—which means less frequent replacement, and consequently, lower maintenance costs. • The ability of the Heil arm hoist to dump the load—regardless of the twist of the chassis frame—is an outstanding advantage because you get dependable operation even when the truck is standing on the roughest ground. From 10 to 15 seconds after the power take-off is engaged, the dump body is raised to full dumping position—an angle of more than 50 degrees—smoothly and noiselessly. The body can be stopped and held at any angle . . . going up or coming down . . . without undue strain on the mechanism. • These are but two of many features that have established this new Heil Twin Arm Hoist as one of the most powerful, efficient, and smooth-operating hoists on the market today. Ask any user of Heil bodies and hoists, he will substantiate our claims of thorough dependability, smooth operation and low maintenance costs.

***Write for informative bulletins.***

BH-97



**Mounting above chassis frame makes Heil arm hoist easy to install, easy to shift...**

The new Heil arm-type hoist has a mounting of 13″ to 14″ above the chassis frame. This style of mounting makes it easily adaptable to any truck chassis. The complete unit is easily adjustable and can be shifted, if necessary, to compensate for an odd wheel base or to vary the load on the rear axle to gain better traction during winter operation. All this can be done without altering the chassis in any way.

ARMY NAVY

# THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

# AT LAST!

## *a truck tire with long recap life*

Today the very life of your business depends on tires that can be recapped not only once—but time and time again. That's why truck owners are talking about the new Fisk Transportation Truck Tire—the tire that gives you more recaps per casing—more miles per recap.

New, more powerful rayon cord now goes into every ply and every impact pad to protect against internal failures, fight rupture growth. Service injuries remain small—repairs cost less—more tires can be recapped.

Now more rubber surrounds each cord in every ply. This greater "rubber-to-rubber" contact welds tread and carcass firmly together, protects against destructive separation. The result is more miles and more months of service—*from the original tread to the last recap.*

Yes—with this combination of big, powerful cords and more "rubber-to-rubber" contact, each new Fisk Transportation Truck Tire not only does its work better than ever before—it does it on fewer plies. Insist on Fisk—the truck tire with long recap life.

**NEW, MORE POWERFUL RAYON CORD . . .** protects against internal injuries . . . fights rupture growth. More tires can be recapped. Repairs cost less.

**GREATER "RUBBER-TO-RUBBER" CONTACT . . .** welds tread and carcass more firmly . . . guards against tread separation, adds months of recap life.

**TIME TO RE-TIRE**
*Reg U. S. Pat. Off.*

**FOR MORE RECAPS PER TIRE . . . MORE MILES PER RECAP . . . *get a* FISK**

# THEY KEEP RING SLOTS *Clear*

Once the slots in oil control rings become clogged, the whole process of building up to an engine overhaul *accelerates.* For this reason alone, the installation of AC Oil Filters and regular replacement of filter elements is worth many times its cost.

Efficient oil filters, kept functioning by regular replacement of dirt-loaded elements, are the surest protection against clogged ring slots. And they also effect other worthwhile economies. From hundreds of fleet experiences, it is proved that AC Oil Filters and AC Elements check oil and fuel waste, retard carbon formation, and prolong ring and cylinder life.

So, AC Oil Filters and Elements not only save you shop expense, and fuel and oil. They also reduce your breakdown time. And *that* benefits both you and the war effort.

**FILTERS—for every engine**
**ELEMENTS—for every filter**

**SPEED FINAL VICTORY—BUY WAR BONDS**

AC OIL FILTERS

**SEND FOR AC SHOP MANUALS**

**Field Service Department, AC Spark Plug Division, G. M. Corp.**
**910 Mott Foundation Building, Flint 3, Michigan**

**Gentlemen: Please send at once, no charge, the AC Shop Manuals checked:** **FO-2**

- ☐ How to Service Spark Plugs
- ☐ How to Service Fuel Pumps
- ☐ How to Service Spark Plug Cleaner
- ☐ How to Service Air Cleaners
- ☐ HOW TO SERVICE OIL FILTERS
- ☐ How to Service Speedometers
- ☐ How to Service Ammeters and other Instruments

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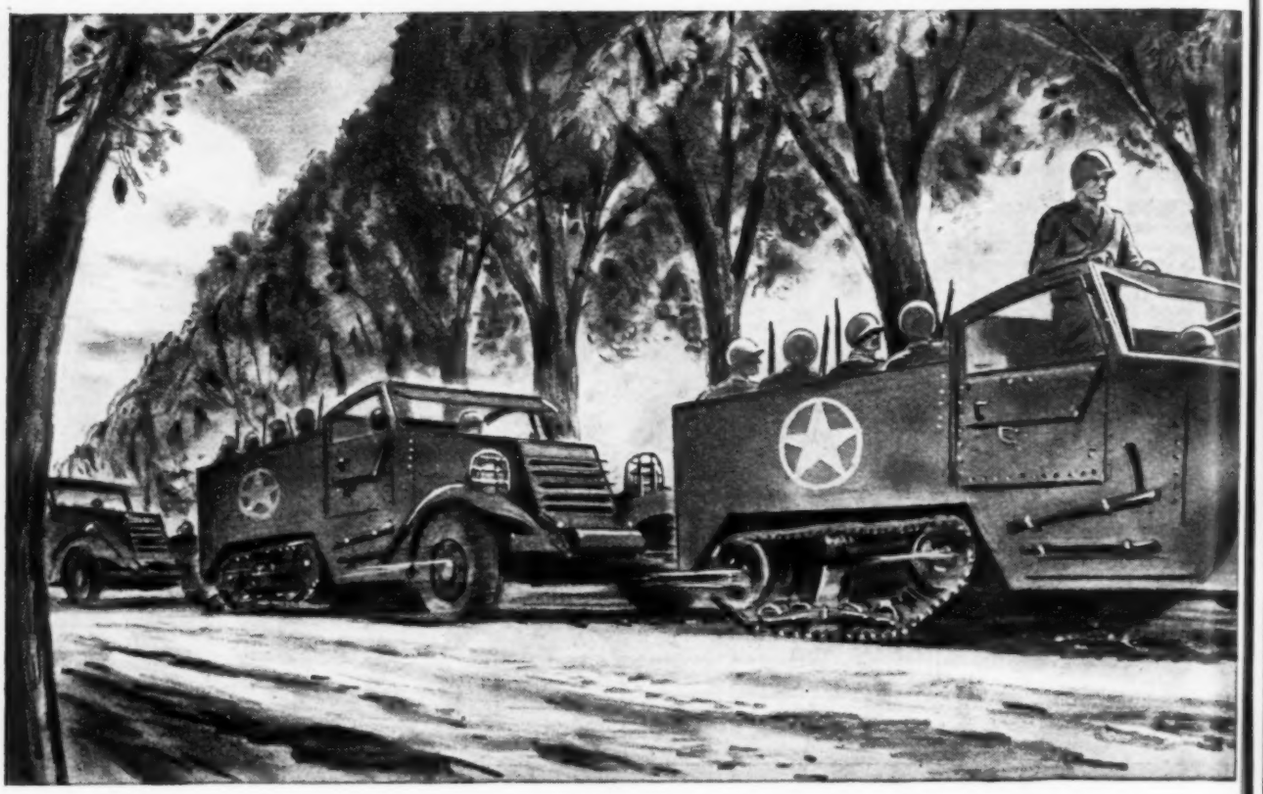

# With the Army, it's lives—

## that this new type of

Battles—and the fate of American soldiers — are decided by the Army's mechanized equipment.

Small wonder, then, that *all Army ground equipment* gets the amazing new type of oil that, over and above superb lubrication, has some spectacular *extra* qualities:

**IT'S DETERGENT** — ends sludge. This oil helps prevent sludge and gum; cleans off old deposits. It also tends to sharply reduce varnish and lacquer on piston skirts.

**IT'S DISPERSIVE** — washes out carbon. This oil keeps the carbon particles separate. They can't "gang up" in trouble-making formations. It washes off old carbon deposits—and all this matter is actually *drained off* with every oil change.

**IT'S ANTI-CORROSIVE**—saves bearings. It protects the new type copper-lead bearings from attacks of corrosive compounds that result from oxidation.

Not *your* life, perhaps, but your livelihood depends on your rolling equipment. *Are you overlooking a vital bet in Veedol 90 H.D.—the same identical type of oil the Army uses?*

Veedol 90 H.D. is fully detergent, dispersive, and anti-corrosive. It can give your equipment *better* miles, *more* miles, *profitable* miles. It can help keep your trucks out of the repair shop. It can greatly increase service between overhauls.

Veedol 90 H.D. comes in S.A.E. 10 to 50. Write *today* for full information and prices.

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**TIDE WATER ASSOCIATED OIL COMPANY**
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TULSA 2, Thompson Bldg.

# with you, it's livelihood

## oil helps protect!

**THE FAMOUS VEEDOL P. M. PLAN IS WAITING FOR YOU, TOO!**

The Veedol Preventive Maintenance Plan is doing a whale of a job for over 800 hardworking fleets. It can help yours. The plan can be tailored to fit any number of units —and costs only 18¢ per truck.

Write today for a Tide Water representative to call and go over this *proven* lifeguard for rolling equipment. You can't get started any too soon!

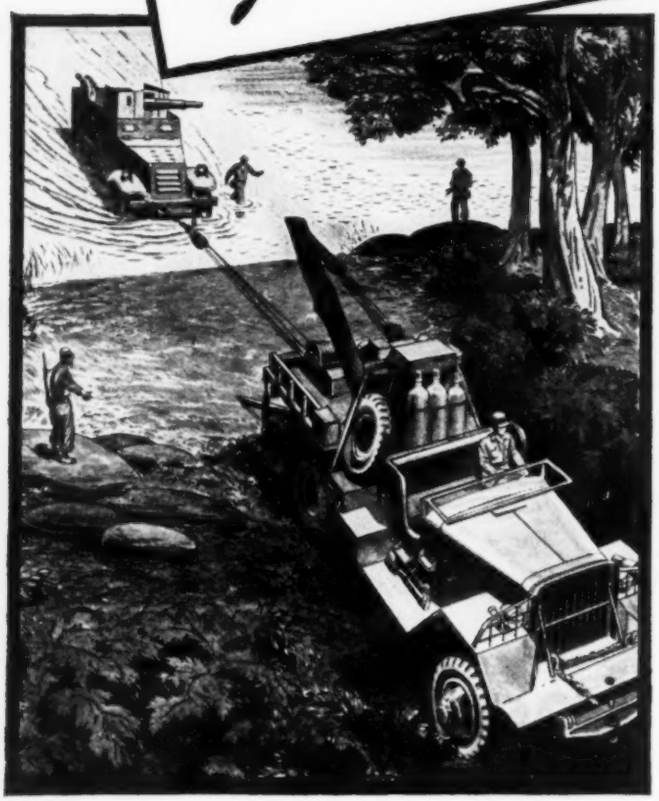
# VEEDOL

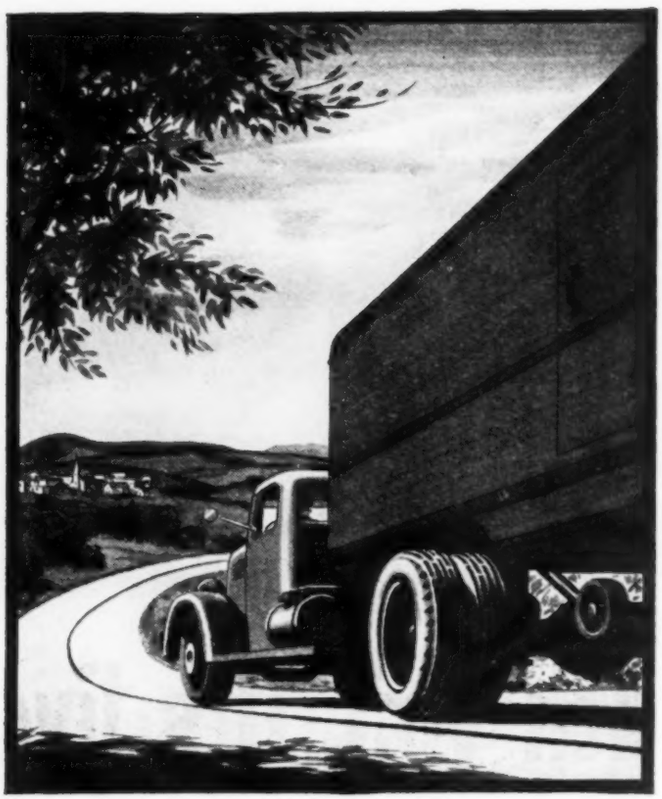
## OILS AND GREASES

VEEDOL
MOTOR OIL

BUY WAR BONDS AND STAMPS

# For a Quick Recovery





"Quick Recovery" is the job of the Heavy Wreckers built by Ward LaFrance for the armed forces. When a tank, truck, or half-track is put out of action, these rugged trucks go out and get them. They bring 'em back through sand, muck and rocky terrain, over nearly impossible trails or, often enough, cross country.

Using this equipment, a Rigger-Wrecker graduating class at the O.R.T.C., Aberdeen Proving Ground, hung up an unchallenged speed record by recovering an overturned five-ton truck from a deep ditch in three minutes and 28 seconds, under simulated battle conditions.

If your fleet has suffered from lost tonnage due to wartime lack of trucks, Ward LaFrance trucks are the best prescription for quick postwar recovery. Whether your needs call for dump trucks, over-the-road tractors (gasoline or Diesel), or vehicles engineered to your individual needs, Ward LaFrance offers your best profit opportunity: . . . A plan developed particularly for fleet owners makes it possible for you to take full advantage of the rugged power and dependability of Ward LaFrance trucks on a basis which will cut the cost of transportation to the bone.

# WARD LAFRANCE

**TRUCK DIVISION**

**GREAT AMERICAN INDUSTRIES, INC.**

**ELMIRA,** GAI **NEW YORK**

## Substitute Parts Mean Makeshift Repairs

Like the home owner who uses a penny to replace a burned-out fuse, the mechanic who uses substitute parts for automotive electrical service is asking for trouble.

# SAFEGUARD YOUR SERVICE BUSINESS

# *Use* Delco-Remy

# ORIGINAL-EQUIPMENT PARTS

On millions of cars and trucks on the road today, Delco-Remy electrical equipment is *original equipment,* designed and built to meet the exacting specifications of automotive engineers. Each unit, each part, contributes to *balanced electrical performance* because it was engineered for the job.

When you repair or replace Delco-Remy electrical units, don't take chances with substitute parts. Use Delco-Remy original-equipment parts and Delco-Remy exchange units. They fit better, last longer, and maintain the balanced performance of the original Delco-Remy electrical system.

Delco-Remy electrical units represent years of experience, research and development in meeting the electrical requirements of cars and trucks. Safeguard the quality of your electrical service with Delco-Remy original-equipment parts.

## DELCO-REMY DISTRIBUTOR PARTS

***Delco-Remy Contact Sets*** . . . again available. Highest quality special tungsten contacts—correct spring tension, weight and balance—correct design for each application.

***Delco-Remy Distributor Caps and Rotors.*** High dielectric strength is an essential factor in the satisfactory performance of distributor caps and rotors. Through laboratory research, Delco-Remy has determined the right molding material to provide maximum protection against voltage breakdown, chipping, warping.

***Delco-Remy Condensers.*** Materials used in Delco-Remy condensers are stored in dehumidified rooms. The winding is performed in an air-conditioned room, with each winding machine individually enclosed in glass. The windings receive special impregnation and are built into a hermetically sealed assembly. These "extras" make Delco-Remy condensers uniformly dependable.

UNITED SERVICE MOTORS

**DELCO-REMY—A UNITED MOTORS LINE**

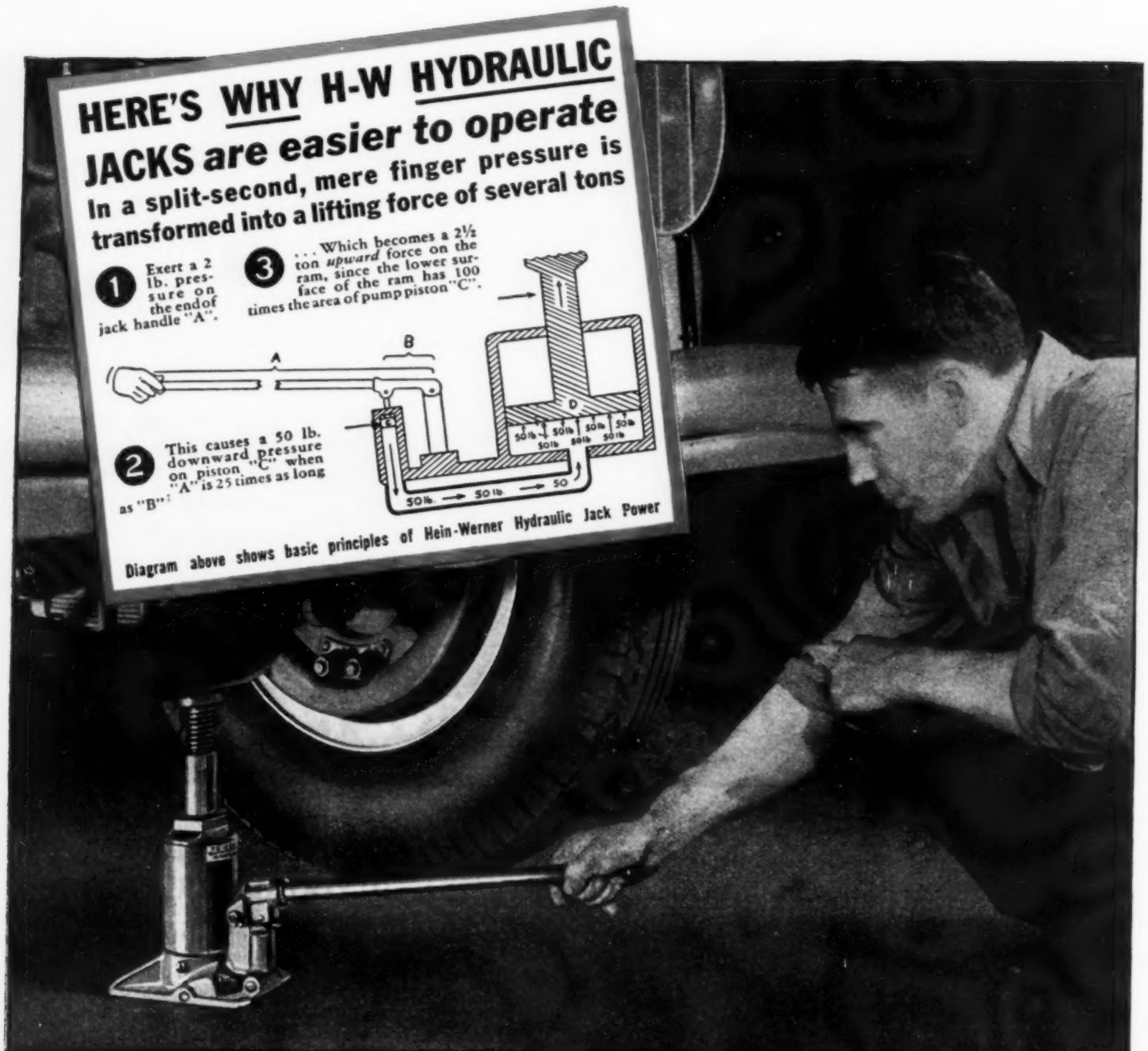
*Delco-Remy service parts and service information are distributed by United Motors Service through independent automotive wholesalers.*

**Delco-Remy**

DIVISION, GENERAL MOTORS CORPORATION
ANDERSON, INDIANA

***KEEP BUYING WAR BONDS***

**WHEREVER WHEELS TURN OR PROPELLERS SPIN**


HERE'S WHY H-W HYDRAULIC
JACKS are easier to operate
In a split-second, mere finger pressure is transformed into a lifting force of several tons
1 Exert a 2 lb. pressure on the end of jack handle "A".
2 This causes a 50 lb. downward pressure on piston "C" when "A" is 25 times as long as "B".
3 . . . Which becomes a 2½ ton upward force on the ram, since the lower surface of the ram has 100 times the area of pump piston "C".
A
B
C
D
50 lb
50 lb
50
Diagram above shows basic principles of Hein-Werner Hydraulic Jack Power

## Super-Powerful... Easy-Operating and Absolutely Dependable

# HEIN-WERNER

## HYDRAULIC JACKS

**Made in models of 3, 5, 8, 12, 20, 30, and 50 tons capacity**

**HEIN-WERNER MOTOR PARTS CORP.**

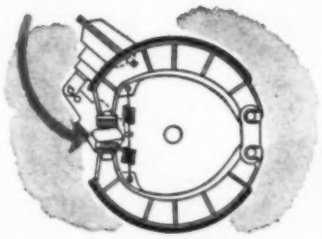
**WAUKESHA, WISCONSIN**

# How do you rate on this 49-second BRAKE SERVICE QUIZ?

## WHY SHOULD WHEELS KEEP TURNING WHEN BRAKED?

All wheels should keep turning when brakes are applied to give better directional control and assure greater safety.

## HOW SHOULD CAM FOLLOWING PLATES BE MOUNTED?



For ease in adjustment and better braking, mount cam following plates in pairs, both plates being of equal thickness.

## WHAT'S THE DIFFERENCE BETWEEN HIGH AND LOW FRICTION LINING?

With high friction lining, less power need be applied to get the same rate of deceleration as that obtained when a low friction lining is used.

## HOW SNUG SHOULD A BRAKE LINING FIT SHOE?

Not more than a .004" or .005" clearance should be allowed between the shoe and the lining.

## WHEN SHOULD AN OVER-SIZED LINING BE USED?

If a drum has been turned and finished so the diameter is increased more than .040", use an oversized lining or shim to compensate for the change in drum curvature.

## Answers ALL QUESTIONS

The Johns-Manville Fleet Reliners' Manual is crammed, with 80 pages of facts, diagrams, charts . . . of *all* well-known truck, bus and trailer brake systems. Invaluable for beginners, handy for experts! For *your* copy, write: Johns-Manville, New York, Chicago, Cleveland, St. Louis, San Francisco.

JOHNS-MANVILLE JM PRODUCTS

# FOR THE HIGHWAY

## U.S. ROYALS FOR JOBS THAT TAKE STAMINA

FAVORITE of thousands of truck operators, the U.S. Royal Fleetway is adapted to all types of heavy duty service on the highway. Extra strength, extra-gauge rayon cords beneath the tread, firmly bonded together, give you a tire body that can take plenty of punishment, yet can be recapped time and again.

With tread specially compounded for long miles of economical, dependable service under heavy loads, the U.S. Royal Fleetway is built to deliver the goods.

To get the most miles from your tires—regardless of make—ask your U.S. Truck Tire Dealer about U.S. Transportation Maintenance.

*Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony program. CBS Network, Sunday afternoon 3:00 to 4:30, E.W.T.*

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# —IT'S THE FLEETWAY

FOR GREATER TRUCK TIRE MILEAGE

## RUBBER COMPANY

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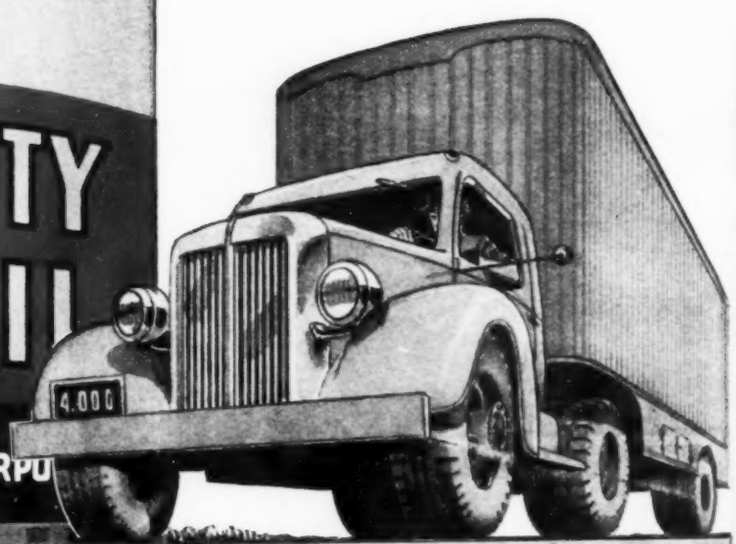
Solvent Processed-Paraffin Base

# D-X

# HEAVY DUTY MOTOR OIL

MID-CONTINENT PETROLEUM CORPO

## For Trucks of Today and Tomorrow!




**Solvent-Processed**
**Detergent Type**
**Dispersive Action**
**Resists Corrosion**

**D-X HEAVY DUTY MOTOR OIL**

**TO PROTECT ENGINE LIFE**

Here is superior lubricating protection because it keeps engines cleaner—Valves, rings, pistons... all are safer with this new solvent-processed motor oil, refined from selected Mid-Continent paraffin base crudes. SAE grades 10 to 50, inclusive.

*Investigate the D-X Preventive Maintenance Plan To Keep Trucks Running*

*Write or phone nearest D-X Office*

**MID-CONTINENT PETROLEUM CORPORATION**

CHICAGO OMAHA TULSA TERRE HAUTE WATERLOO

For Light Trucks, Commercial Cars
**DIAMOND 760 MOTOR OIL**

For All Diesel Engines
**D-X DIESEL MOTOR OIL**

## *Another Great Leader in a Great Line... FWD's Model SU*

## Famous 5-Tonner Tops

# $ 75,000,000.00 ENDORSEMENT

When a single model of a heavy duty truck is purchased in volume reaching a total dollar value of $75,000,000.00 in less than four years time, it rightfully gains leadership in its field. FWD's Model SU has won an extraordinary recognition—the endorsement of motor truck buyers exemplified in $75,000,000.00 worth of trucks bought and used since 1940.

It is significant, too, that in a comparatively brief period of years this single model FWD has a background of $75,000,000.00 in manufacturing experience as well. In every sense it is a great leader in a great line of trucks.

The FWD model SU represents the most advanced development of the four-wheel-drive principle originally pioneered and sponsored by FWD since 1910. It is eminently qualified in every element of design and construction to render service of a character and extent far beyond that of any other truck.

More than ever before essential industries and motor transport organizations rely on Four-Wheel-Drive hauling power to do more work — cover more miles — at lower cost for gas — oil — tires — replacements.

When your need is dependable all-season, all-weather hauling power — look to FWD's — a great line of trucks.

**THE FOUR WHEEL DRIVE AUTO CO.**
**Clintonville, Wisconsin**
*Canadian Factory: KITCHENER, ONT.*

**DEST AND ORIGINAL EXCLUSIVE** **BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS**

# "Steelductor HELPS IMPROVE GAS ECONOMY"

says **W. E. LONG,** Long Transportation Company
1020 18th Street, Detroit, Mich.

"WE'VE been using Auto-Lite Steelductor spark plug wire in our trucks for over a year," explains Mr. Long, "and are highly pleased with performance results."

Across the nation, fleet owners are proving that Steelductor in shielded circuits helps improve performance of trucks and buses. If you have trouble maintaining schedules because of inferior or worn ignition cables, find out how Auto-Lite Steelductor is helping fleet operators coast to coast. See your jobber, or write to

**THE ELECTRIC AUTO-LITE COMPANY**
*Merchandising Division*
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TUNE IN "EVERYTHING FOR THE BOYS" STARRING DICK HAYMES—EVERY TUESDAY NIGHT—NBC NETWORK

# AUTO-LITE *Automotive* WIRE and CABLE

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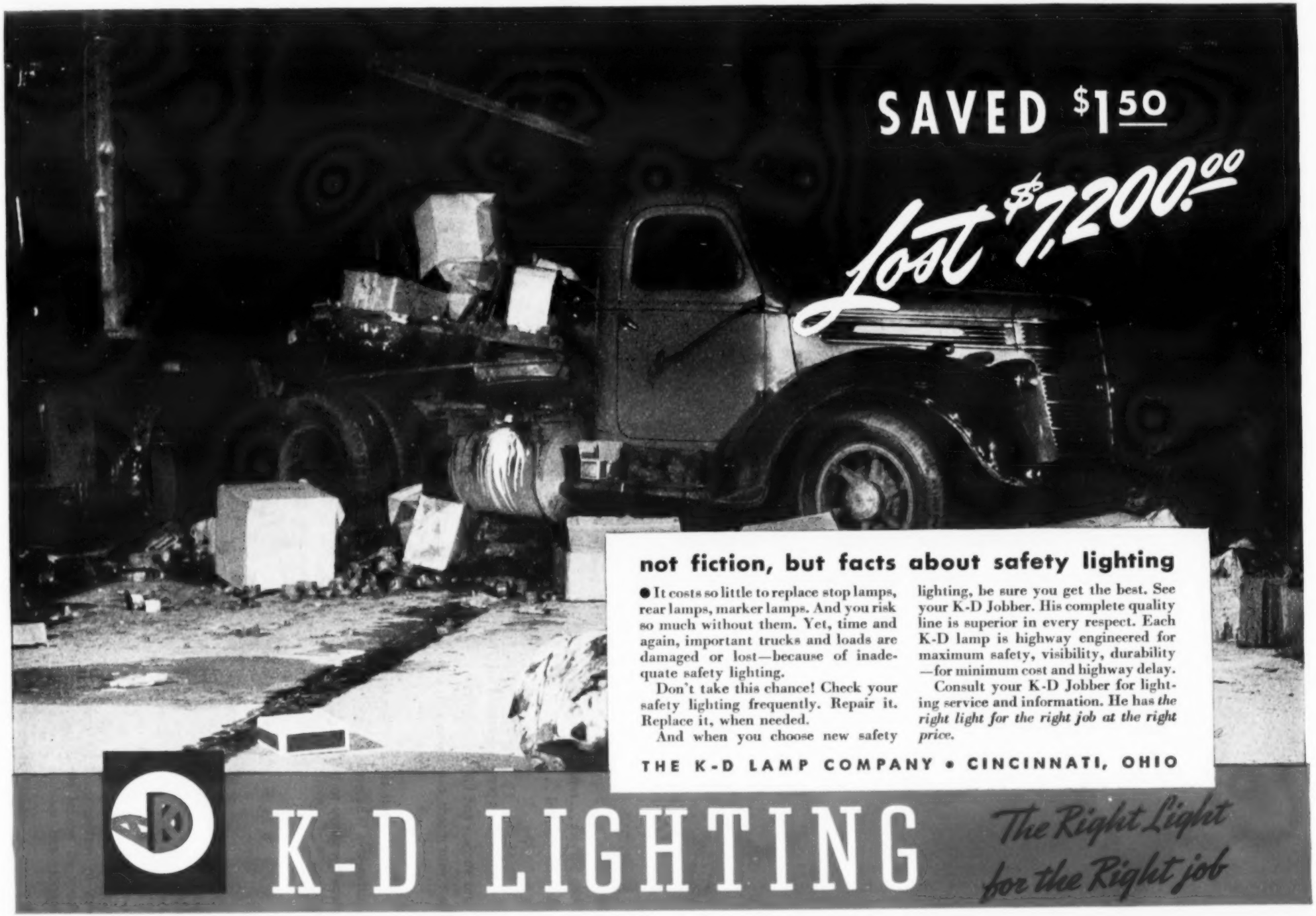
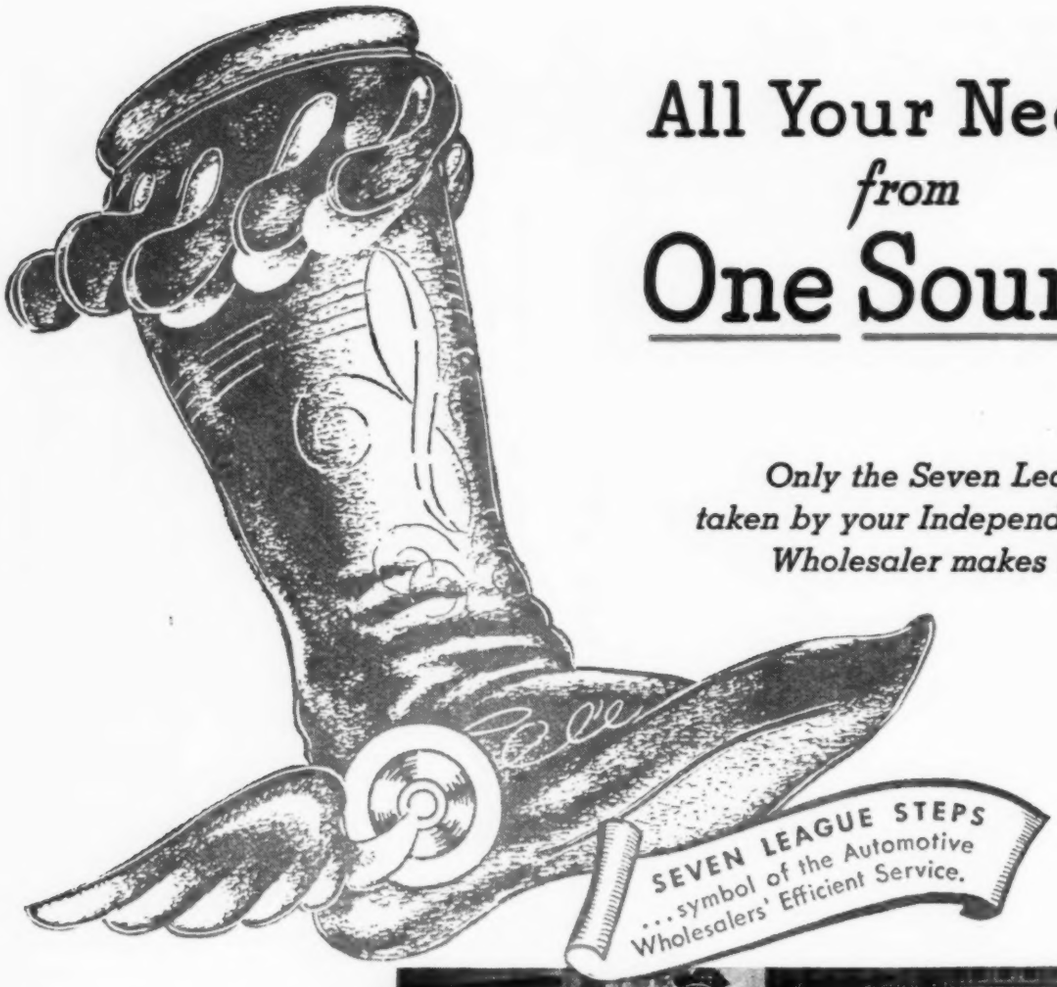

SAVED $1.50
Lost $7,200.00
not fiction, but facts about safety lighting
● It costs so little to replace stop lamps, rear lamps, marker lamps. And you risk so much without them. Yet, time and again, important trucks and loads are damaged or lost—because of inadequate safety lighting.
Don't take this chance! Check your safety lighting frequently. Repair it. Replace it, when needed.
And when you choose new safety lighting, be sure you get the best. See your K-D Jobber. His complete quality line is superior in every respect. Each K-D lamp is highway engineered for maximum safety, visibility, durability —for minimum cost and highway delay.
Consult your K-D Jobber for lighting service and information. He has the right light for the right job at the right price.
THE K-D LAMP COMPANY • CINCINNATI, OHIO
K-D LIGHTING
The Right Light for the Right Job

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## *By Costing Less to Run!*

Many large fleet operators have learned to place so much reliance in Federal trucks that they are now standardizing on these dependable units.

One very important reason for this is unquestionably the fact that Federals have never been "round peg trucks in square hole jobs." The wide range of models, power ratings and varying tonnage capacities offered by Federal have enabled the buyer to fit the right truck to his specific needs with cost-saving results.

Hence, Federal's reputation for building trucks that last for years, pay out better and, in the words of owners: "Cost less to run."

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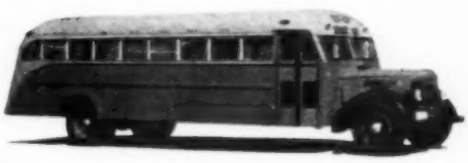
As further evidence of this ability to produce highly efficient, dependable motor transport units, the Army and Navy again have recognized Federal with a third "E" citation for meritorious service in meeting the needs of our Armed Forces . . . a tribute to Federal's truck manufacturing proficiency and long experience.

**CONSERVE YOUR TRUCKS**

*While Federal is now producing certain models for essential civilian needs—your patriotic duty still demands periodic truck check-ups to "Keep 'em Rolling for Victory."*

**FEDERAL MOTOR TRUCK COMPANY, DETROIT 9, MICHIGAN**

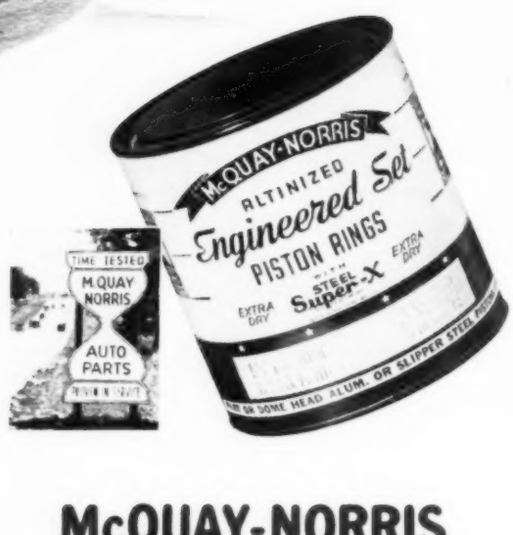


# FEDERAL TRUCKS

*Since 1910 . . . Known in Every Country—Sold on Every Continent*

# HOW MANY TIMES HAVE YOUR TRUCKS DRIVEN AROUND THE WORLD?

The mileage on your trucks is enormous. And they've still got a long way to go, till new trucks are easy to get. But you can keep your motors at peak efficiency by replacing worn parts with genuine McQuay-Norris parts . . . Altinized Engineered Set Piston Rings and other parts from the complete McQuay-Norris line . . . parts engineered specifically for each make and model of truck.




**McQUAY-NORRIS**
**ALTINIZED**
***Engineered Set***
**PISTON RINGS**

# McQUAY-NORRIS

*PISTON RINGS • PISTONS • PINS • VALVES*
*BOLTS • BUSHINGS • SILENT-U SHACKLES*

TIME TESTED
McQUAY NORRIS
AUTO PARTS
PROVEN IN SERVICE

*BEARINGS • SLEEVES • PUMP PARTS*
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# FOR UTMOST RELIABILITY IN THE HEART OF THE FUEL SYSTEM

AVAILABLE FROM THE AC WHOLESALER

Your AC Fuel Pumps give you such dependable service and long life because *highest quality is built in,* from blueprints to finished products. There is one sure way to protect that reliability and durability,—insist upon AC pumps and parts.

***FOR REPLACEMENT***—install new AC Fuel Pumps or Authorized Factory Rebuilt AC Fuel Pumps.

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**QUALITY FEATURES**

- Careful control of pressure and flow assuring correct fuel supply.
- Accurate hardening, precision machining of parts essential to long life.
- Accurate control of spring tensions and temper.
- High, and controlled, pin hardness.
- 4-layer patented-impregnation diaphragms of special airplane cloth.
- Carefully finished rocker arm pads, located to center on cam.
- Split-hair rocker arm clearance and control of pad hardness.
- Uniform pull rod hardness at pin holes.

**BUY WAR BONDS – BRING VICTORY QUICKER**

AC

# FUEL PUMPS

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Gentlemen: Please send at once, no charge, the AC Shop Manuals checked:

☐ How to Service Spark Plugs ☐ HOW TO SERVICE FUEL PUMPS
☐ How to Service Spark Plug Cleaner ☐ How to Service Air Cleaners
☐ How to Service Oil Filters ☐ How to Service Speedometers
☐ How to Service Ammeters and other Instruments

FO-2

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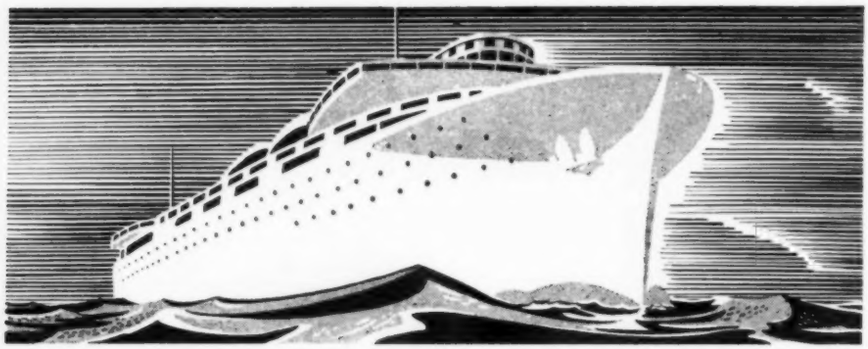


# *Your ship comes in*

When the ship's engines have the cylinders treated with PORUS-KROME . . . *your ship comes in.* It is mighty important in marine engines to do everything possible to prevent the ship being held up for engine repairs far from home.

This is equally true when "your ship" is a bus . . . or a truck . . . or a farm tractor working the far forty. Reliability of engine performance, which assures that you will always get home, is most important.

PORUS-KROME, because of its peculiar characteristics, reduces scoring and scuffing and the risk of piston seizure to the absolute minimum. It not only adds to the reliability of the engine, but it multiplies the life of the cylinders from four to twenty times, thus greatly reducing costs of overhauling for cylinder repairs.

PORUS-KROME, applied to cylinder bores by the Van der Horst process, is pure, hard chromium which has myriads of tiny pores and channels in its surface. These pores and channels serve as reservoirs which hold lubricating oil and feed it back to the cylinder surface as needed. Better lubrication, plus the fact that chromium is so much harder than iron or steel, reduces wear to a minimum.

Plan now to have PORUS-KROME in your gasoline and Diesel engines. Write for booklet telling more about PORUS-KROME.

**PORUS - KROME**

*Good for the Life of your Engines*

VAN DER HORST

U. S. PATENTS 2,046,878 AND 2,214,684

**VAN DER HORST CORPORATION OF AMERICA**

AN AFFILIATE OF DRESSER INDUSTRIES

OLEAN • NEW YORK
CLEVELAND 11 • OHIO

# DOUBLE PROTECTION for Trucks and Buses

## NO DIM-OUT NO BLACK-OUT

## WITH Guide SEALED BEAM HEADLAMP UNITS

There is no "dim-out" with a Guide Sealed Beam headlamp unit. This sturdy, metal-backed unit stays bright throughout its long life. It is sealed against dust, dirt and traffic film, to maintain its high light output.

There is no "black-out" with a Guide Sealed Beam headlamp unit in the event of a cracked lens. For safety, a separate self-contained bulb is provided within the sealed unit. If a lens is cracked, the Guide headlamp unit continues to provide safe lighting until the damaged unit can be replaced. Guide stays on the job even though the "air seal" is broken.

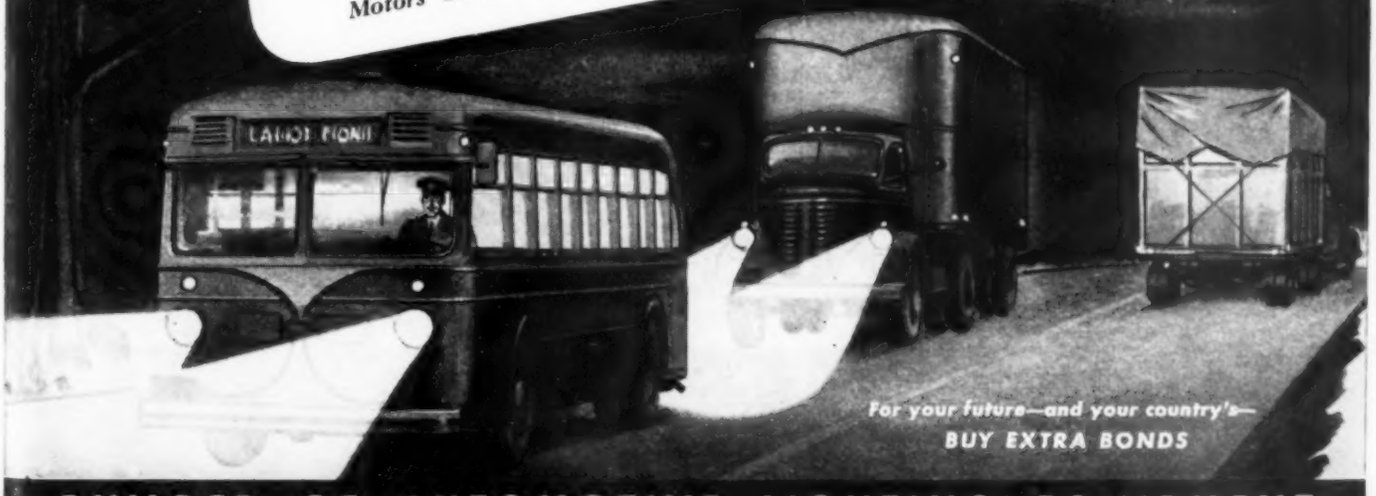
This double protection is an important safety factor. For the best in Sealed Beam lighting, use Guide Sealed Beam headlamp units for replacement. Available for all '40, '41 and '42 model cars, trucks and buses.

**LET SAFETY SHARE THE RIDE—REPLACE WITH GUIDE**

UNITED SERVICE MOTORS

*Guide Sealed Beam replacement units and Guide lamp service parts are sold by United Motors Service distributors.*

Guide LAMP
DIVISION OF
GENERAL MOTORS
ANDERSON, INDIANA



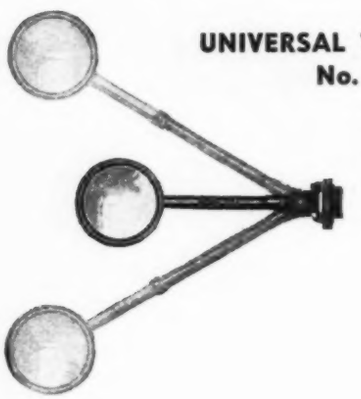

*For your future—and your country's—*
**BUY EXTRA BONDS**

**BUILDER OF AUTOMOTIVE LIGHTING EQUIPMENT**

# *Speaking of* GOOD NUMBERS

•

## *Here are three!*



**UNIVERSAL TRUCK MIRROR**
**No. 229-UV**

Completely adjustable —universal adjustment, upward, downward, backward, forward. Fits all trucks. Can be installed direct to body or to door hinge.

**REPLACEMENT MIRROR HEAD**
**No. 222**

For Ford and Chevrolet trucks. Fits all truck mirror arms. Adjustable to any angle for rear vision.

**HEAVY DUTY STEEL RIM TRUCK MIRROR HEAD**
**No. 2108-A**

The substitute number for ear type rubber rim heads on Protecto mirrors. Aluminized finish. Withstands extraordinary abuse.

## AND JUST AROUND THE CORNER

Before a great many months have rolled around we hope to be able to again provide you with your old stand-by—

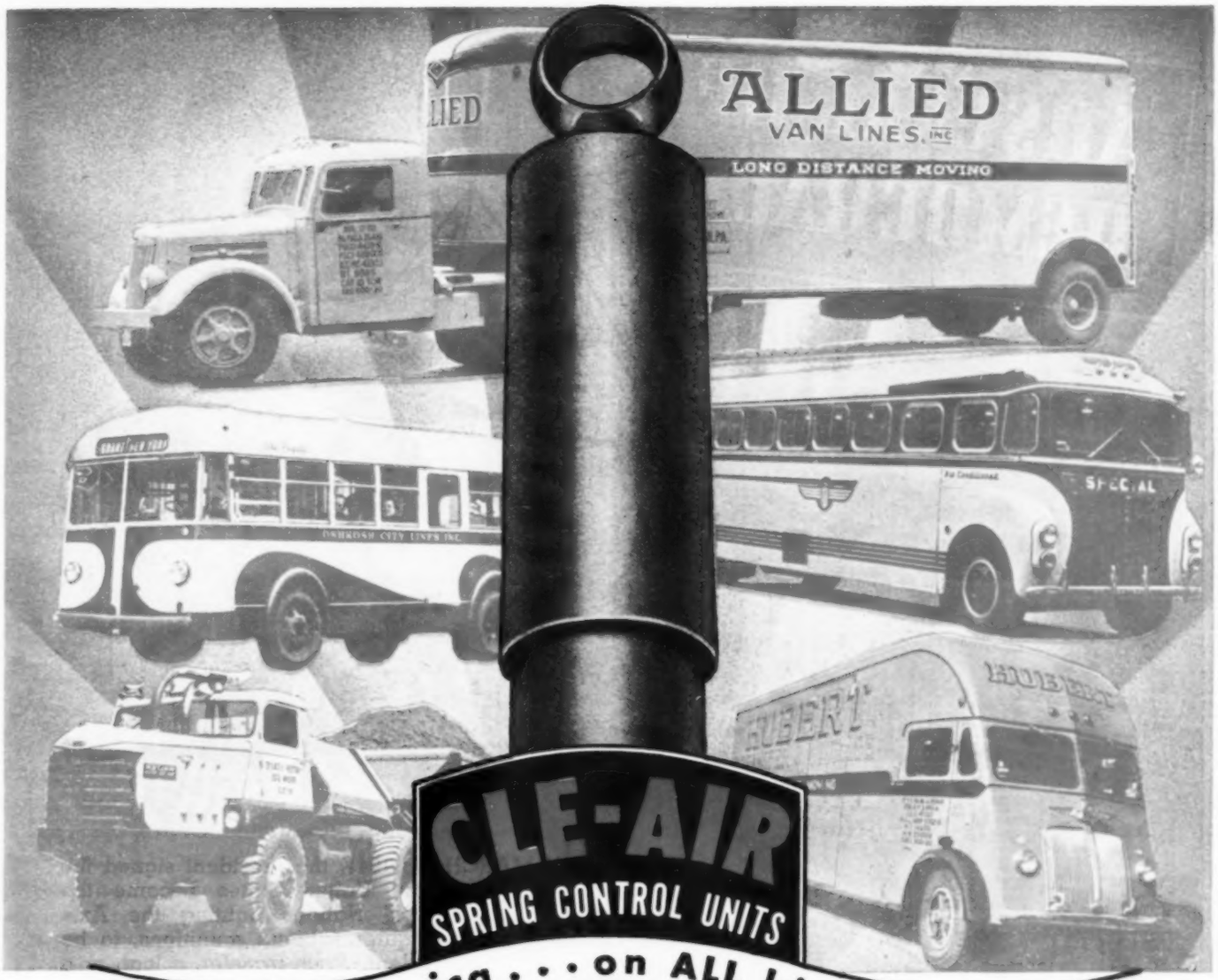
***KING BEE Rubber Rim Mirrors***

In the meantime we are confident you will find the above numbers give excellent service. We appreciate your cooperation in these difficult times.

**AMERICAN AUTOMATIC DEVICES CO.**

*Manufacturers of the Famous* KING BEE *Products*

HARRISON, THROOP AND CONGRESS STREETS • • CHICAGO, ILL.




## ALL over America . . . on ALL kinds of fleets!

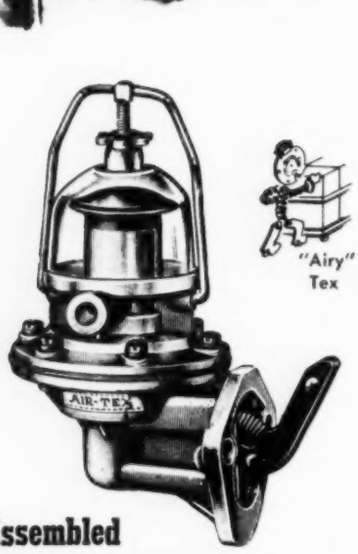
FROM Main Street to the Mesabi Ranges, Cle-Air units are contributing to the efficiency of American highway transportation. On Main Street , Cle-Air units protect overworked, heavily-loaded buses from damaging road shocks, reduce tire wear, increase passenger comfort. Likewise, in vast open pit iron ore mines, Cle-Air units help huge, heavily-loaded ore-carrying tractor trucks stand up under extra gruelling service.

Cle-Air spring control units are equally efficient on all sizes and types of buses, trucks, full and semi-trailers. Identical in principal with our world-famous Aerol landing gear for airplanes, they are precision engineered and built to exacting aircraft tolerances. *Only* Cle-Air units have *double-acting* (hydraulic-pneumatic) ride control. Backed by 50 years manufacturing experience; they are built in the most modern plant facilities.

***These are a few reasons why Cle-Air spring control units will contribute to the efficient operation of your fleet. New, illustrated bulletin contains complete information. Send for your copy now!***

**THE CLEVELAND PNEUMATIC TOOL CO.**
AUTOMOTIVE DIVISION CLEVELAND 5, OHIO

ON MARCH 11, 1941, the President signed the Lend-Lease Bill and the United States became the "Arsenal of Democracy." Nations fighting the Axis could lease unlimited equipment and munitions, to be repaid in kind or equivalent. Each transfer, a loan or a trade for preserving civilization . . . part of a flow of arms that would, as the President said later, "accelerate from day to day, until the stream becomes a river, and the river a torrent, engulfing this totalitarian tyranny which seeks to dominate the world." Lend-Lease means countless "deals" that profit one and all.







**Assembled with AIRTEX Diaphragms Guaranteed for 50,000 Miles**

**You, too, will make a profitable DEAL on every ailing fuel pump you trade to your jobber for**

*Factory Tested*

# AIRTEX

*Exchange* **FUEL PUMPS**

*"Your profits climb with the AIRTEX Line"*

BUY MORE BONDS

**AIRTEX AUTOMOTIVE CORPORATION, FAIRFIELD, ILL.**

# Shop Records Prove How FRAM Pays For Itself Many Times Over!

When we say that Fram filters save motors, parts, oil and overhauls, we're not just making vague claims. Instead, we're giving you:

**Hard Facts . .** as proven by actual maintenance records from shops and garages the country over. Listen to what one big fleet owner says: "More than 200,000 miles before reboring, using Fram!" And a Los Angeles operator writes: "Wear found to be 3 and 4 times less on engines equipped with Fram." While a Kansas City bus company reports: "Fram cuts engine wear in half." Those are facts, not fiction, and we're backing them up with . . .

**Cold Cash . .** under the famous Fram guarantee. Yes, if after 90 days trial you're not convinced that Fram saves its cost many times over, we'll gladly refund your money. You've everything to gain and nothing to lose by trying Fram filters!

**Act Now . .** If your fleet has no filters, put on big, heavy-duty Fram *now!* And if your fleet *has* filters, step up performance with Fram Replacement Cartridges. Genuine Fram Replacement Cartridges keep oil physically and visibly clean by filtering out dirt, dust, carbon and sludge, while Fram's exclusive chemical treatment impedes formation of acids and other harmful corrosives that eat away motor parts. Keep your fleet rolling! Call your Fram jobber today! *In Canada:* J. C. Adams Co., Ltd., Toronto.

**FRAM CORPORATION, Providence 16, R. I.**

**NO ENGINE IS COMPLETE WITHOUT AN OIL FILTER.**

# FRAM *Oil and Motor Cleaner*

WAR BONDS SAVE LIVES

# IT'S BACK
## IN CIVILIAN PRODUCTION—
New and Improved
PACKARD FOUR-FORTY
IGNITION CABLE
"The Tough Protective Sheath Makes All the Difference"

THE IGNITION CABLE THAT OUTLASTS AND OUTPERFORMS ALL OTHERS . . . THE IGNITION CABLE THAT DEALERS PUT IN FIRST PLACE BEFORE THE WAR . . . IS NOW BEING PRODUCED IN EVER-INCREASING VOLUME TO MEET CIVILIAN NEEDS. YOU'VE WAITED THREE YEARS FOR PACKARD FOUR-FORTY—YOU WON'T HAVE TO WAIT MUCH LONGER!

### FIRST CALL FOR FOUR-FORTY GOES TO HEAVY-DUTY VEHICLES

Because Packard Four-Forty's extra toughness is so important in heavy-duty service, Packard is asking jobbers to give fleet operators first call on the initial shipments of Packard Four-Forty ignition cable. Packard's production facilities insure that *all* demands for Packard Four-Forty will be satisfied in a short time.

Packard
REG. U. S. PAT. OFF.
TRADE MARK

PACKARD ELECTRIC DIVISION
GENERAL MOTORS CORPORATION
WARREN, OHIO

YOU'RE RIGHT WITH Packard CABLE

FOREMOST BUILDER OF AUTOMOTIVE AND AVIATION WIRING

To conserve cable—use it right

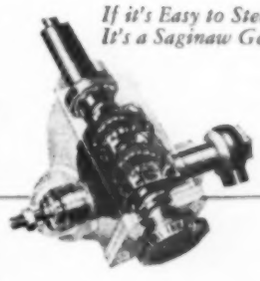
PACKARD CERTIFIED RE-WIRING SERVICE

A vital service based on the proper service methods for using Packard cable. Ask your Packard jobber about it.

# 400 MILES AND FRESH AS A DAISY!

Because Saginaw (Recirculating Ball-Nut) Steering Gears make steering so effortless, truck drivers can make long hauls over busy highways and through teeming city traffic and alight from their cabs still fresh and alert. • Progressive fleet owners who are interested in reducing driver fatigue and eliminating costly accidents and delays, operate buses and trucks equipped with Saginaw Steering Gears.

*If it's Easy to Steer*
*It's a Saginaw Gear*



**SAGINAW STEERING GEAR DIVISION**
**GENERAL MOTORS CORPORATION • SAGINAW, MICHIGAN**

MANUFACTURERS OF STEERING GEAR ASSEMBLIES, STEERING LINKAGE ASSEMBLIES, UNIVERSAL JOINTS AND PROPELLER SHAFTS, DIESEL ENGINE AND AIRCRAFT PARTS • ORIGINATORS OF THE "BALL BEARING SCREW AND NUT" FOR ALL PURPOSES.

# For Your Trucks or Buses— — Don't Just Order a "FAN BELT"

**Multiple-Ply Cover . . .**
*Much Longer Wearing Than on Passenger Car Belts*

**30% Stronger Cords**
*Than Used in Passenger Car Belts*

***Special* Heavy-Duty Compound**

## Sold for TRUCK and BUS USE Only!

The Gates TRUCK Belt is sold for use on trucks and buses ONLY. This is because some of the materials used are allocated for this particular purpose. Truck and bus transportation is important in the war effort. Gates TRUCK Belts must be used on trucks and buses only. Each belt container bears this statement.

### LOS ANGELES, Cal.

"In our heavy hauling from Arizona across desert and semi-desert regions with the thermometer frequently well over 100 degrees, we can run your Gates TRUCK Belt long after it would have been necessary to replace any other belt we have used."

—Consolidated Copper State Lines. R. C. Hutchison. Shop Supt.

"BEST EVER USED"

### CHICAGO, Ill.

"On our more than 200 units in cross country service your special TRUCK belt operates air conditioning equipment in addition to the extra heavy belt load due to rear engine drives. We are getting 80% longer wear than any other belt has ever given in this unusually tough service."

—All American Bus Lines. H. Weinstein. Gen'l Pur. Agt.

"80% LONGER LIFE"

"WEARS TWICE AS LONG"

### WELLSBORO, Pa.

"Since using your special TRUCK belts we haven't had a single road failure. They often last twice as long as other belts. We can count with safety on at least 50% longer life."

—H. W. Taynton Trucking. Robert Taynton.

### SHREVEPORT, La.

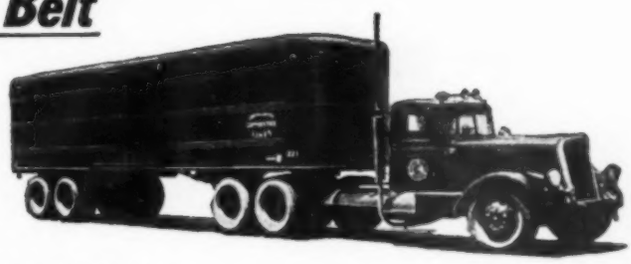
"Your specially engineered TRUCK belt has eliminated fan belt worry. It outlasts any truck belt we ever used before by one-third or more."

—Louisiana & North West Transfer Co., A. H. Semple.

"OUTLASTS ANY OTHER BELT"

# Drive in a GATES TRUCK BELT!

## Why expect a "Passenger Car" Fan Belt to Stand Up in TRUCK SERVICE?



You would never for one minute expect a passenger car tire to stand up in service on your trucks or buses. Naturally not, because you know that on trucks and buses tires have a tougher job to do—a bigger, stronger, more rugged tire is naturally needed.

**And just the moment you think of the matter, you realize at once that exactly the same facts apply to belts.**

A typical passenger car belt, for example, carries a 3.8 horsepower load. The belt on a regular truck must transmit 13 horsepower to turn the fan, pump and generator. In addition, trucks and buses run longer hours—often 24 hours a day. They must change speeds as many as 600 times a day with rapid acceleration, abrupt deceleration, stops, starts and idling—all of which put a strain on truck and bus belts far greater than a passenger car belt ever has to stand.

Is it any wonder that big operators by the hundreds are turning to the one belt that is specially engineered for this extra heavy service—the Gates TRUCK Belt.

### The ONLY Belt Especially Made for TRUCKS and BUSES

**No wonder it gives 50% to 80% LONGER WEAR**

Read the letters reproduced on these pages. They tell you how practical, experienced, hard-headed operators are getting 50% to 80% longer belt wear since they began using the Gates TRUCK Belt. More important they tell you how much valuable operating time they are saving through fewer road failures and fewer delays for servicing.

If you are interested in keeping your trucks and buses operating most efficiently and economically, call your jobber today and tell him to send you a trial order of Gates TRUCK Belts.

### Hundreds of BIG OPERATORS say "50% to 80% Longer Wear"

**NEWARK, N. J.**

"CUTS COSTS IN HALF"

"Really tough service on our milk trucks played havoc with belts until we installed Gates Specially Engineered Truck Belts. We are now using only half as many belts as before—and saving a lot of time previously spent on belt adjustment."
—Bloomingdale Dairy Co., Inc., Edwin R. Funtel, Maint. Supt.

**MILWAUKEE, Wis.**

"FAR SUPERIOR"

"Your specially engineered TRUCK belt is now in use on our entire fleet. It is far superior to any belt we have ever used."
—Advance Express Co., Dave Winters.

**SACRAMENTO, Cal.**

"We installed your Series 'T' Black Truck Belt when it was first placed on the market and it is giving approximately 90% longer service than even your pre-war belt."
—Gibson Lines, W. T. Smith, Shop Supt.

"90% LONGER SERVICE"

### GATES Jobbers NOW Have Stocks to Serve You!

THIS IS A Gates PRODUCT

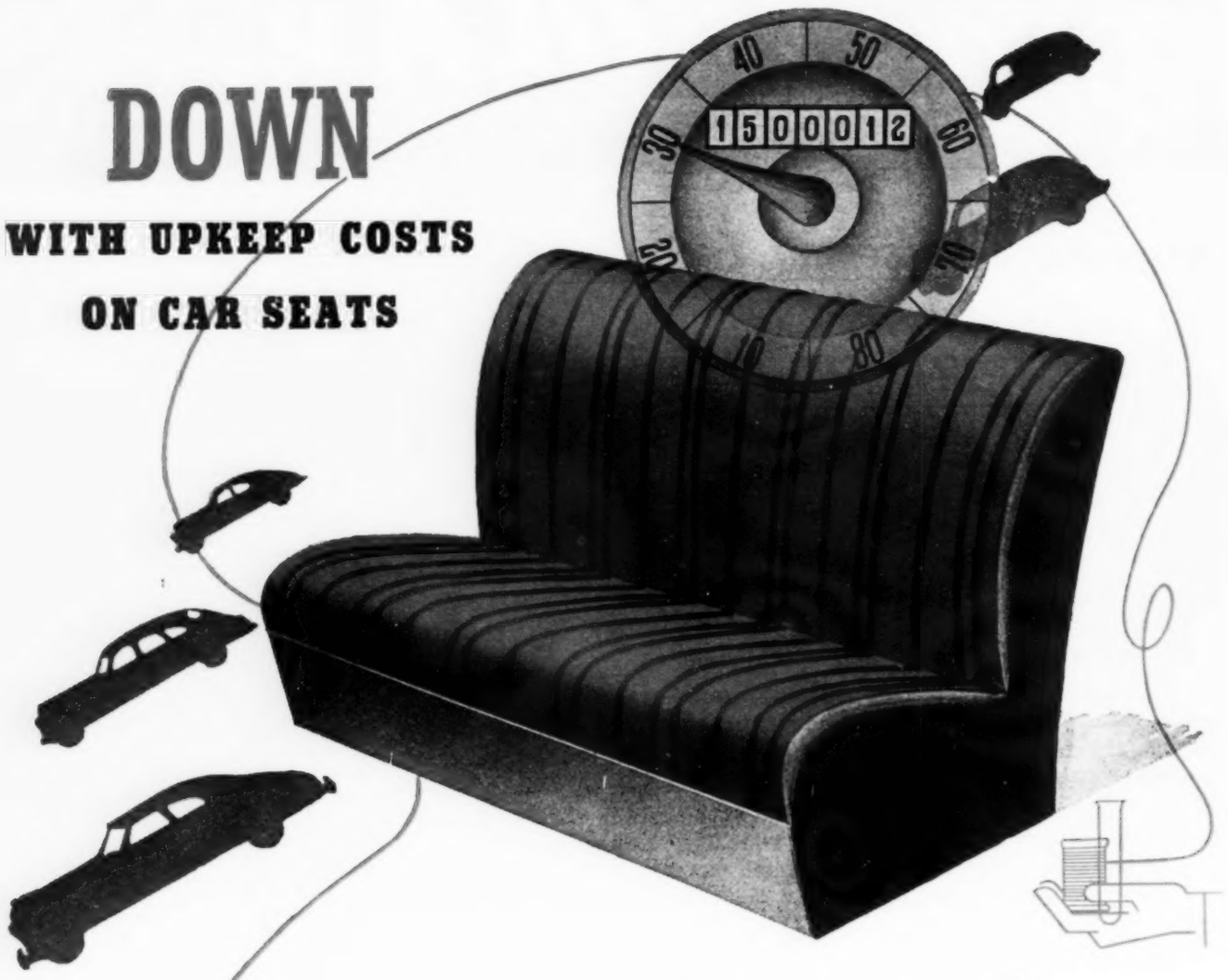
**The GATES RUBBER CO., Denver, U. S. A.**

*World's Largest Makers of V-Belts*

7445

# DOWN

## WITH UPKEEP COSTS ON CAR SEATS




## Have them upholstered in VELON*

Forget about seat upholstery that stretches, sags, soils, wears out.

Cut your repair and replacement costs to practically zero!

You can do it with *Velon*—Firestone's entirely *new* kind of fabric for seat coverings. That's been proved by years of the hardest use in the upholstery of thousands of truck, car, bus and cab seats, where no *Velon* seat has yet worn out, or lost its original bright new beauty.

No matter what the color, *Velon* comes back fresh and clean as the day it was installed, at a mere wipe with a damp cloth or cleaning fluid. Grease won't hold. Dust can't cling. Water won't absorb. Nothing can stain it. It's safe, non-inflammable, and it absolutely can not fade.

Take full advantage of this new and different wonder-material after the war. All the *Velon* Firestone can make right now goes to our armed forces. But Firestone engineers are ready to plan with you now toward any application your imagination suggests.

P.S. For completely modern seating use Foamex cushioning, Firestone's rubber latex foam.

Listen to the Voice of Firestone Monday evenings over NBC

ANOTHER CONTRIBUTION TO A BETTER WAY OF LIFE BY **Firestone**

*Trademark—Pronounced VEL-LON

# in an OIL FILTER it's the REFILL that COUNTS!

Make no mistake about it . . . *INSIDE* every one of your oil filters is where the work is done! Either the Refill you install is *up* to its exacting job, or the best oil filter *falls down* on keeping your vital wartime motors clean.

This famous "sock-type", oil filter refill construction throws its full weight into the job of keeping lubricants sludge-free . . . even the Knit Cover filters, TOO! No chemicals—no abrasives—just a beautifully engineered, sludge-hungry element that makes oil go farther and do more in any filter equipped motor. Put WIX to work on YOUR payload units NOW . . . you'll reduce lay-ups for overhauls and find a new maximum in longer, more effective oil mileage.

FINEST SELECTED WHITE COTTON THREADS
•
NO ABRASIVES
•
NO CHEMICALS
•
THE KNIT COVER FILTERS, TOO!

wix
TRADE MARK
FILTERFILS

WIX ACCESSORIES CORPORATION GASTONIA • N·C·

WAREHOUSES: ATLANTA • CHICAGO • DALLAS • KANSAS CITY • LOS ANGELES • MINNEAPOLIS • NEW YORK
SAN FRANCISCO • CANADIAN FACTORY: WIX ACCESSORIES CORP. LTD., 161 Bay St., Toronto, Ont.

# Oil *film* is the most important thing in your service shop!

THINK! Why is it that every metal bearing surface in every motor in every truck or bus you maintain would *seize* if it were not protected by oil film?

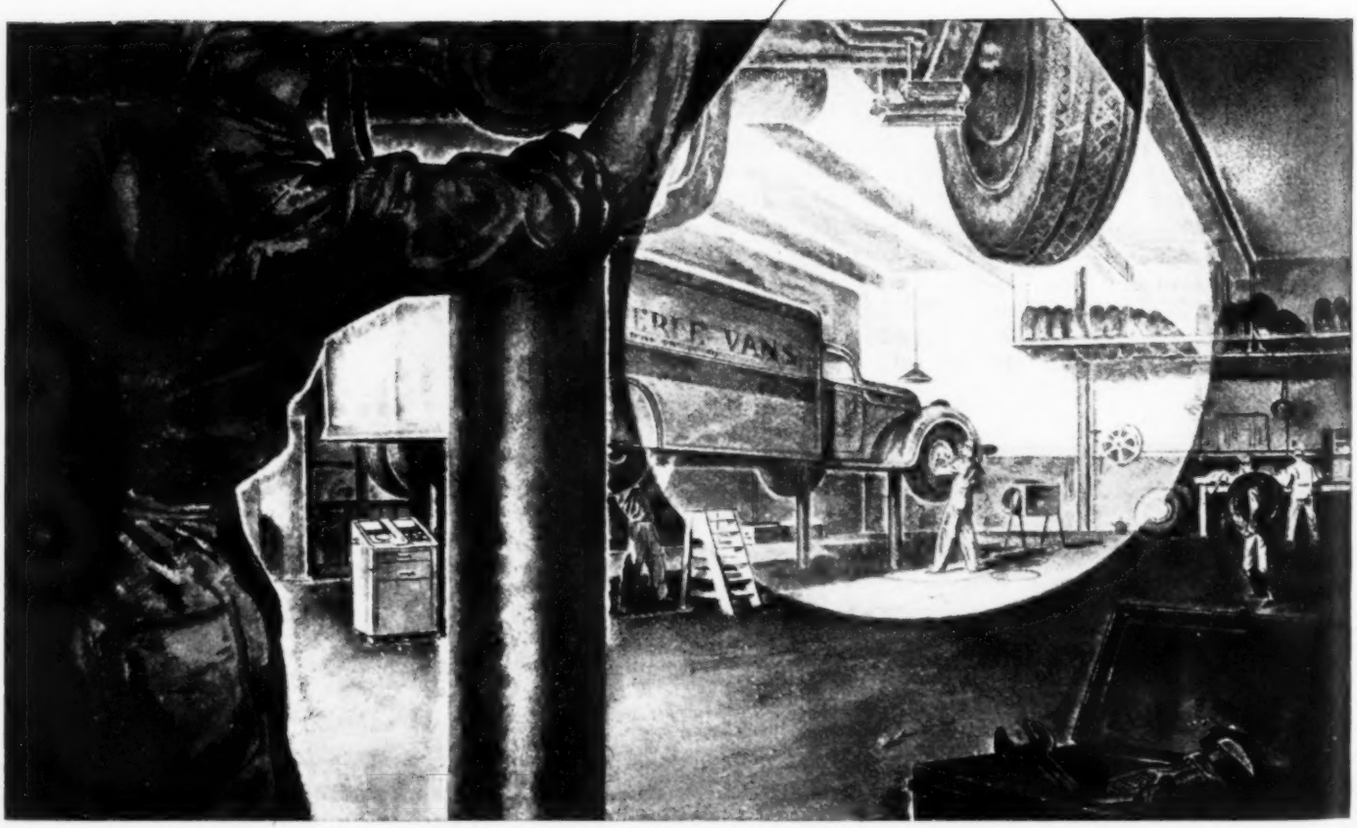
How is it that an almost inconceivably thin film of oil can withstand conditions of heat, pressure and sliding friction that no metal can endure? Not even scientists have the complete answer. But you service men know that good oil does mean everything to motor life—motor oil that can be depended on for efficient and lasting lubrication.

*Quaker State HD Oil* has the extra efficiency and lasting power that you need so urgently today. More—it has a most unusual ability to keep motor bearing surfaces *clean*.

**QUAKER STATE**
**HD OIL**
AND QUAKER STATE SUPERFINE LUBRICANTS

Pledged U.S. TRUCK CONSERVATION CORPS

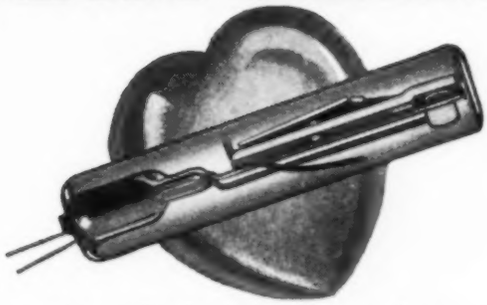
**Quaker State HD Oil for your trucks, buses and tractors**
**Quaker State Motor Oil for your passenger cars**



QUAKER STATE OIL REFINING CORPORATION · OIL CITY, PENNSYLVANIA

## You're Looking at a

# GLASS HEART!



### It's an Exclusive Feature that Puts the "Push" in STEWART-WARNER ELECTRIC FUEL PUMPS

Only 2¼" long, this little glass tube holds the contact points *sealed in hydrogen.* This assures constant positive pump action. The hydrogen in the tube keeps the points cleaned automatically, and greatly reduces burning, sticking, and pitting. Operated and controlled magnetically. Approved by the famous Underwriter's Laboratories.

## Here's the Traffic-Tested STEWART-WARNER ELECTRIC FUEL PUMP

### *that Ends Vapor-Lock and Fuel Pump Failure!*

TODAY'S schedules don't allow for delays caused by vapor-lock and fuel pump failure. This is no time to risk ruining irreplaceable equipment because of fuel pump fire. Never has every truck been more vital in the battle of transportation.

That's why Stewart-Warner Electric Fuel Pumps are going on more and more trucks, either as replacements or as auxiliary "safety" pumps for heavy-duty operation.

The pump is easily mounted at the tank. It *pushes* fuel to the carburetor under pressure, eliminating air bubbles and vapor-lock. No rotating parts, no piston, no bearings to fail. Lasts longer because it doesn't "beat itself to death." Delivers 15 gallons an hour on an average current of approximately one ampere. Requires no attention.

Another feature is the well-tested special diaphragm of DuPont Fairprene that *absolutely won't* fail! The contact points sealed in hydrogen-filled tube insure long contact point life.

Write today for complete information. Stewart-Warner Corporation, 1831 Diversey Parkway, Chicago 14, Illinois.

DELIVERS 15 GALLONS PER HOUR

**AVAILABLE NOW!**

• Use Stewart-Warner Dual Electric Fuel Pumps where gas consumption is high—gas mileage lower than average. Dual pumps more than double the life of each pump. Can be installed so that each pump operates independently.

Another Product of STEWART WARNER

# STEWART-WARNER

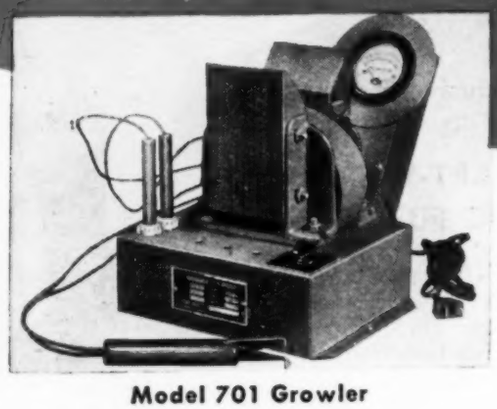
**ELECTRIC FUEL PUMP**

**STEWART-WARNER CORPORATION**

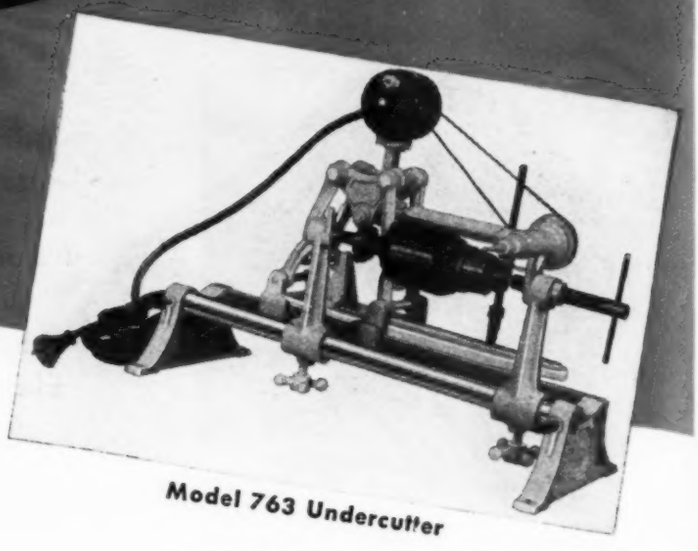
# B&E BATTERY ELECTRICAL EQUIPMENT

Weidenhoff

**. . . also Engine Analyzers, Battery Chargers, Magneto Testers, Test Benches, Electrical Testing and Service Equipment.**



**Model 701 Growler**



**Model 763 Undercutter**

Speed up electrical service with these four pieces of typical equipment in the Weidenhoff B&E line. They'll lick those tough service problems on generators, starting motors, armatures and handle more efficiently those every-day jobs encountered in electrical service.

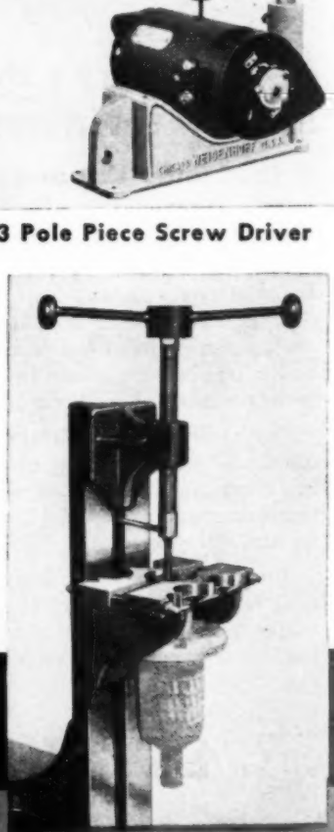
**MODEL 701 GROWLER**—Double wound meter type. Indicates defective wiring, nature of defect, location of troubles, etc. Handles armatures not possible in other growlers.

**MODEL 763 UNDERCUTTER**—Heavy duty type. Undercuts commutators up to 6 in. diameter. Centers adjusted to 18 in. Handles all types armatures.

**Model 973 Pole Piece Screw Driver**

**MODEL 973 POLE PIECE SCREW DRIVER**—Instantly removes or replaces pole piece screws without damaging parts. Ratchet handle operates right or left. Ruggedly built for hard service.

**MODEL 967 PULLER PRESS**—Quick acting arbor and puller press for removing and replacing bearings, bushings, races, caps, slip rings, etc. Saves time and prevents breakage.



**Model 967 Puller Press**

Weidenhoff equipment is a money-maker in your shop.
Write for information on the complete B & E line.

AUTOMOTIVE SERVICE WEIDENHOFF EQUIPMENT AVIATION

JOSEPH
**WEIDENHOFF**
INC.
**CHICAGO 24, ILLINOIS**

# From where they *Grow* to where they *Go!*

**TRUCK OPERATORS AND FLEET OWNERS**

Write for your copies of illustrated color booklets which give full details of the economy and many improvements built into the new Highway "Freightmasters" and "Clippers."

U.S. 36

*ON EVERY U. S. HIGHWAY*

Grain and livestock from the fertile farmlands of America's windswept plains, destined for the nation's market places. How best to get them there? By HIGHWAY Trailer, of course! For on thousands of roads all over America, Highway Trailers have demonstrated their utter dependability in carrying greater pay loads at lower cost.

Now, with a partial return to the manufacture of commercial trailers, Highway engineers are utilizing the experience acquired from the punishing tests of three years of wartime transportation.

See the new Highway trailers now coming off the production lines. They are sturdier than ever before, yet lighter in weight, easier to maintain, and capable of carrying even heavier loads to the nation's market places.

**HIGHWAY TRAILER COMPANY**

*Factory and General Offices,* Edgerton, Wisconsin

ARMY E NAVY

Truck Trailers and Bodies • Earth Boring Machines
Winches and other Public Utility Equipment

# HIGHWAY *AMERICA'S QUALITY* TRAILERS

# Only OILDEX
## OIL DILUTION EXTRACTOR OFFERS THESE EXCLUSIVE Motor Maintenance Economies

**IMPROVES EFFICIENCY OF COLD WEATHER OPERATION**

Excess water does not condense in crankcase—with danger of freezing, breaks, and other cold weather hazards — if OILDEX Oil Dilution Extractor is on the job!

Dependable METERED and CONTROLLED Crankcase Ventilation

PLUS

These Additional Advantages:

- Removal of water, acid and unburned gasoline from the crankcase.
- Rapid detection of leaky or porous blocks and blown gaskets.
- Restriction of sludge formation and crankcase varnish.
- Protects driver, foodstuffs, etc., from crankcase fumes—particularly obnoxious in winter driving when windows are closed.

QUICKLY AND PROFITABLY INSTALLED ON ANY MOTOR. ALL MAKES OF CARS, TRUCKS, BUSSES, TRACTORS, MARINE AND STATIONARY GASOLINE ENGINES CAN BE EQUIPPED. Specify model and year of car when ordering on our money back guarantee. OILDEX lists at $15.00—FILTREX $10.00 —Complete with Fittings. (Slightly Higher on West Coast)

PATENT NO. 1,990,657 — OTHER PATENTS PENDING — TRADE MARK REGISTERED

## FILTREX

OILDEX removing liquid impurities and FILTREX removing solid and semi-solid impurities the **motor** receives COMPLETE Protection.

- Light—Compact—Strong
- Series of different densities of filtering elements
- Partially balanced method of filtration.
- Low cost of replacements

## FACTORY WAREHOUSE DISTRIBUTORS

EASTERN SEABOARD: General Motive Parts Co., 61 Amsterdam Avenue, New York 23, N. Y.
ARIZONA: Diesel Motor & Equipment Co., 1279 So. Central Ave., Phoenix, Arizona
OHIO: Service Products Co., 981 The Arcade, Cleveland 14, Ohio
SOUTHWEST: Midwest Distributors, Box No. 3233 Capitol Bldg., Oklahoma City, Oklahoma
CANADA: Hickson Sales Co., 47 Richmond St., E, Toronto 1, Ontario
OTHER TERRITORIES STILL OPEN—or in process of negotiation. If you are interested, please write or wire at once.

# MOTOR ECONOMY PRODUCTS, INC.

DIVISION OF WATSON ELEVATOR COMPANY, INC.

407 WEST 36th STREET NEW YORK, 18, N.Y.

# BEST "GO" SIGN!

## ...For cost-conscious Truck Operators

● Night and day, on every highway in America, Kellys *go*—keeping up with stiff schedules. The new Kellys are living up to expectations. *They're tough.*

KELLY Springfield TIRES

Completely redesigned to insure maximum performance from new materials, today's new Kelly is cooler-running. The tread is designed scientifically to resist tearing, cutting and chipping.

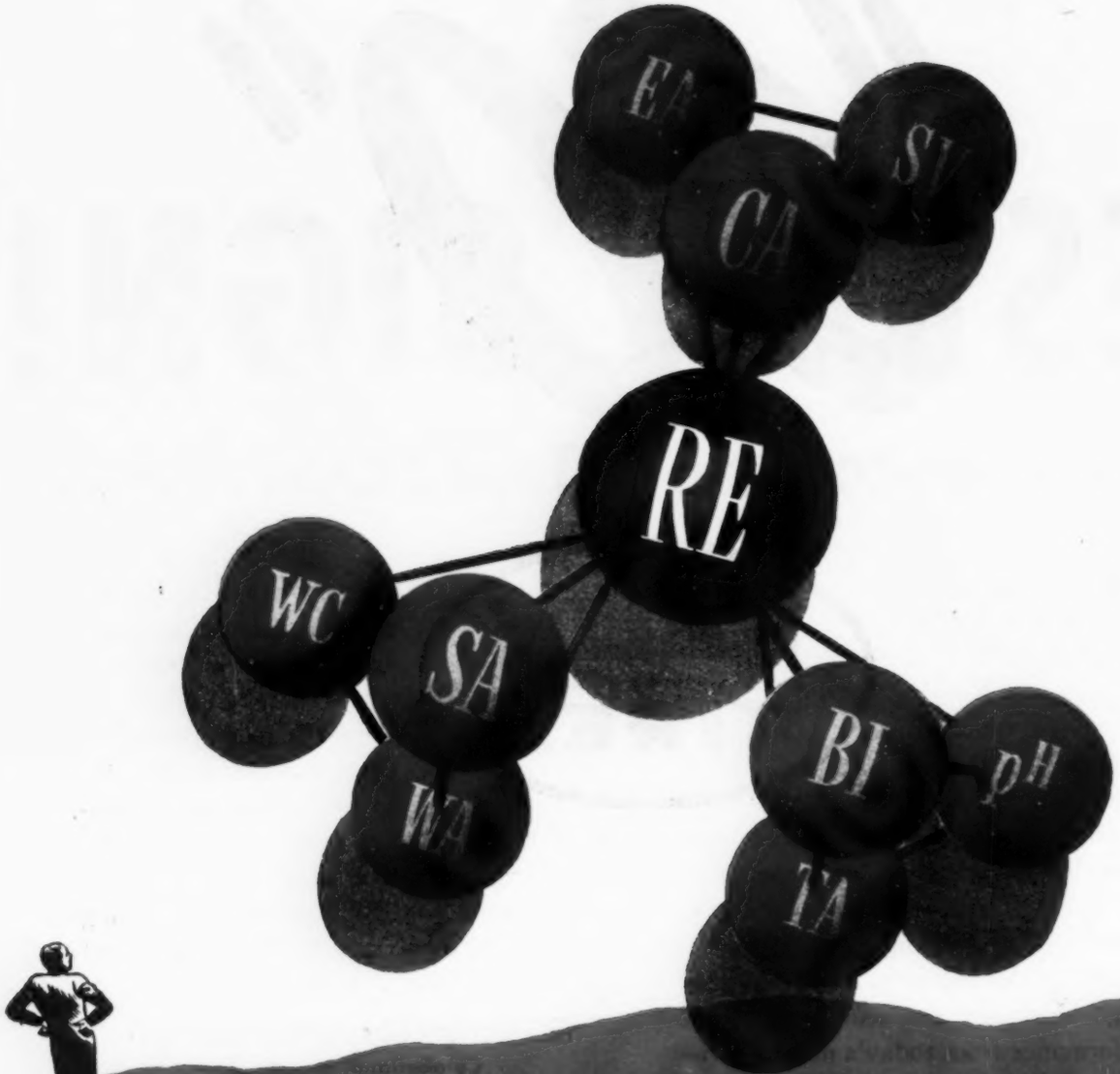
Continual developments in compounding and in engineering are producing constantly better performance from today's new materials. Expanded facilities and the latest improved machinery and equipment are your assurance that Kellys will continue in the future, as in the past, to render better than average service. To cost-conscious truck operators that is a good guide to follow when they're eligible for new tires.

Meanwhile, keep your present tires rolling by depending on your Kelly Dealer for expert tire-saving service . . . repairs . . . recaps.

**THE KELLY-SPRINGFIELD TIRE COMPANY**
**Cumberland, Maryland**

**Green** **Means "GO"—**
**Keep Going on**

# KELLY Springfield TIRES




## THIS IS WHAT HAPPENS WHEN YOU WASH A TRUCK

**Correctly cleaning a truck is no simple operation... these elements must go into action...**

Wetting Action *(WA)* must lower surface and interfacial tensions and allow the cleaning solution to penetrate to surface of the base. Emulsifying Action *(EA)* must disperse grease and oil as tiny globules, and by suspension prevent redeposition. Saponifying Value *(SV)* must convert organic fats and oils into soluble soaps, and Solvent Action *(SA)* put soils into solution. Colloidal Activity *(CA)* must disperse solid soils into minute particles which may then be easily removed. Water Conditioning *(WC)* removes or controls the elements which cause water hardness.

Correct Buffer Index *(BI)* assures ability to absorb either alkaline or acid soil, thus prolonging efficiency of the solution. Proper *pH* assures the correct measure of energy of alkalinity and Total Alkalinity *(TA)* must supply maximum active cleaning energy.

... In formulating a cleaning compound, therefore, it is obvious that no one factor is a magic key to all problems. The answer is in determining the relative value of *all* these factors as they apply to *your* problem.

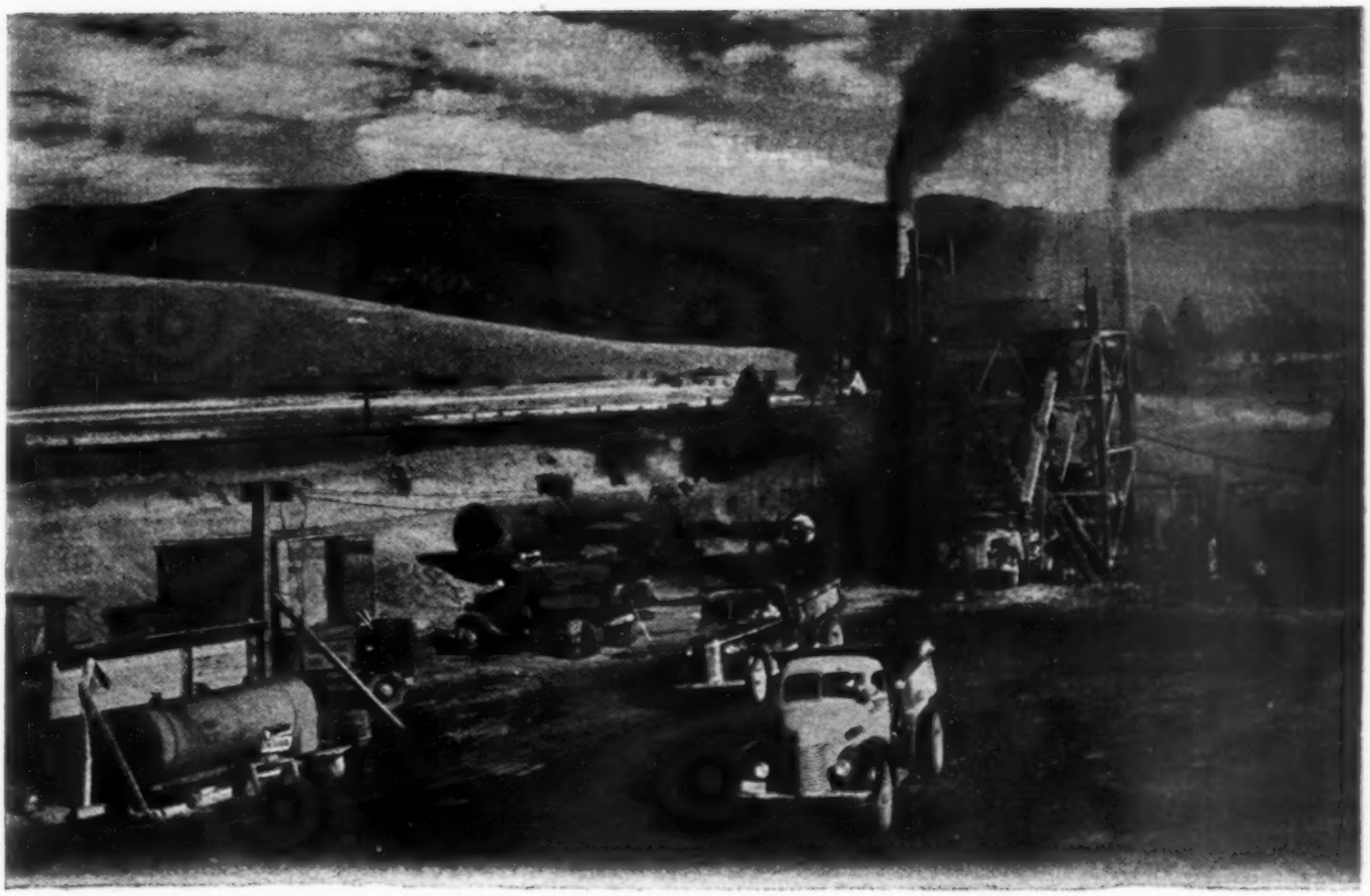
Putting these factors into correct balance is a responsibility you can entrust to Turco chemists —a responsibility for which their two decades of Research and Experience *(RE)* have well qualified them. *Take your problem to Turco.*

*For a fuller explanation of these vital factors, write for Turco's Booklet on post-war letterhead, please.*

TURCO

**INDUSTRIAL CHEMICAL COMPOUNDS**

TURCO PRODUCTS, INC. *Main Office and Factory:* 6135 S. Central Ave., Los Angeles 1, Calif. • *Southern Factory:* 1606 Henderson St., Houston 1, Texas • *Chicago Office and Factory:* 125 West 46th Street, Chicago 9 • *Offices and Warehouses in All Principal Cities*



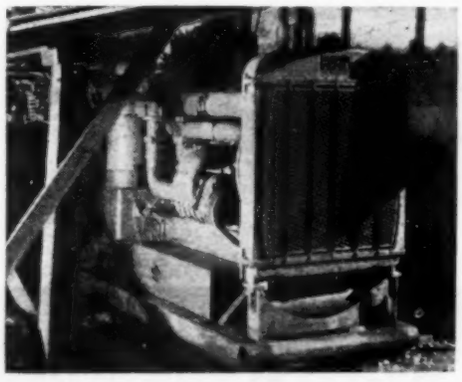
# SUPERCHARGING made this power Portable

PRODUCING 125 tons of hot-mix an hour, for resurfacing Highway 10, near Frenchtown, Mont., this asphalt plant required more power than an ordinary portable generator could supply.

Today this plant is operating on a single-unit, self-contained Murphy Diesel Generating Set, supercharged by B-W. Weighing only approximately 9,000 pounds, the unit supplies 106 Kilowatts and is easily manageable on a heavy truck.

To provide more power in a given space or weight . . . or to compensate for loss of power at higher altitudes . . . and with little appreciable increase in weight — B-W Supercharging finds many uses in engines for the marine, industrial, transportation, and automotive fields.

*This Murphy Diesel Generating Set, supercharged by B-W, is producing 106 kilowatts. The actual size of the unit is only 11 feet long, 40 inches wide, and 5 feet 6 inches high*

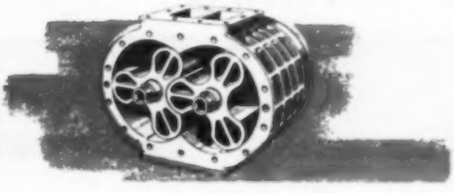


ENGINEERING B-W PRODUCTION

**SUPERCHARGERS, INC.**

A DIVISION OF BORG-WARNER

*Milwaukee 9, Wisconsin*



*B-W Superchargers are precision-built for the most efficient operation and long, trouble-free service.*

"THIS ONE SHOULDN'T EVER HAVE *BRAKE* TROUBLE"

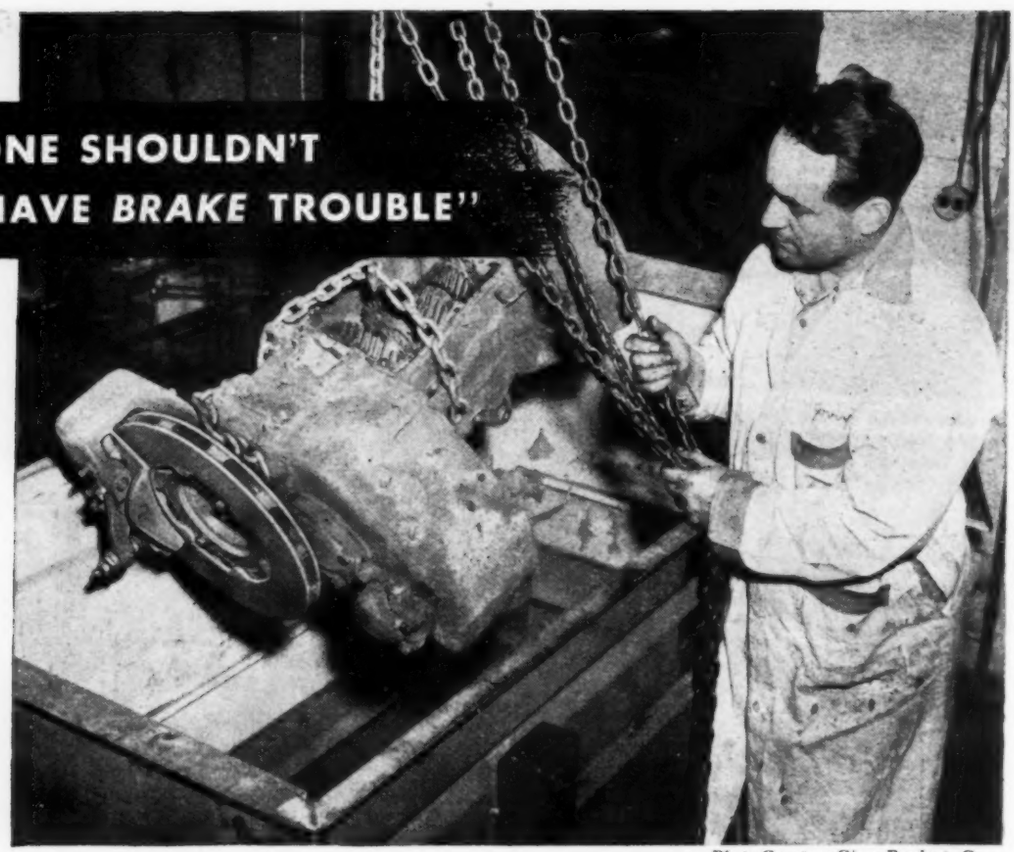
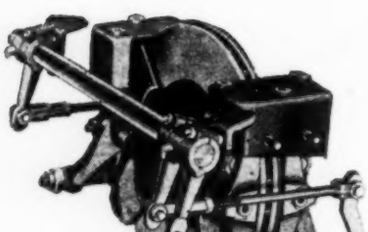


*Photo Courtesy Circo Products Co.*

## *How* CAN A MAN TELL ABOUT BRAKES BY LOOKING AT A TRANSMISSION ASSEMBLY?

He can't. But what this man sees, installed at the rear end of that transmission, is a **TRU-STOP** *Emergency* **BRAKE** with its ventilated disc. That tells him a lot.



**TRU-STOP** *Emergency* **BRAKES**
Operate on propeller shaft. Disc-type. Positive, sure. A flow of air is circulated through the disc. This air dissipates the heat of braking. Thus linings last far longer—brake service is required less often. Drivers can help save service brakes by increased use of emergency brake.

**TRU-STOPS** are engineered to stop and hold the entire load—to give many more smooth, safe stops from one set of linings. On a per-mile or per-stop basis **TRU-STOPS** cost definitely less. That's because (1) they don't have to be relined so often and (2) relining is an easy, quick and inexpensive job. Add that to the increased assurance of safety and you'll understand why more and more trucks, buses and combinations are being equipped with **TRU-STOPS**.

*For more specific information, write our Detroit office*

**TRU-STOP** *Emergency* **BRAKES**

ACCO

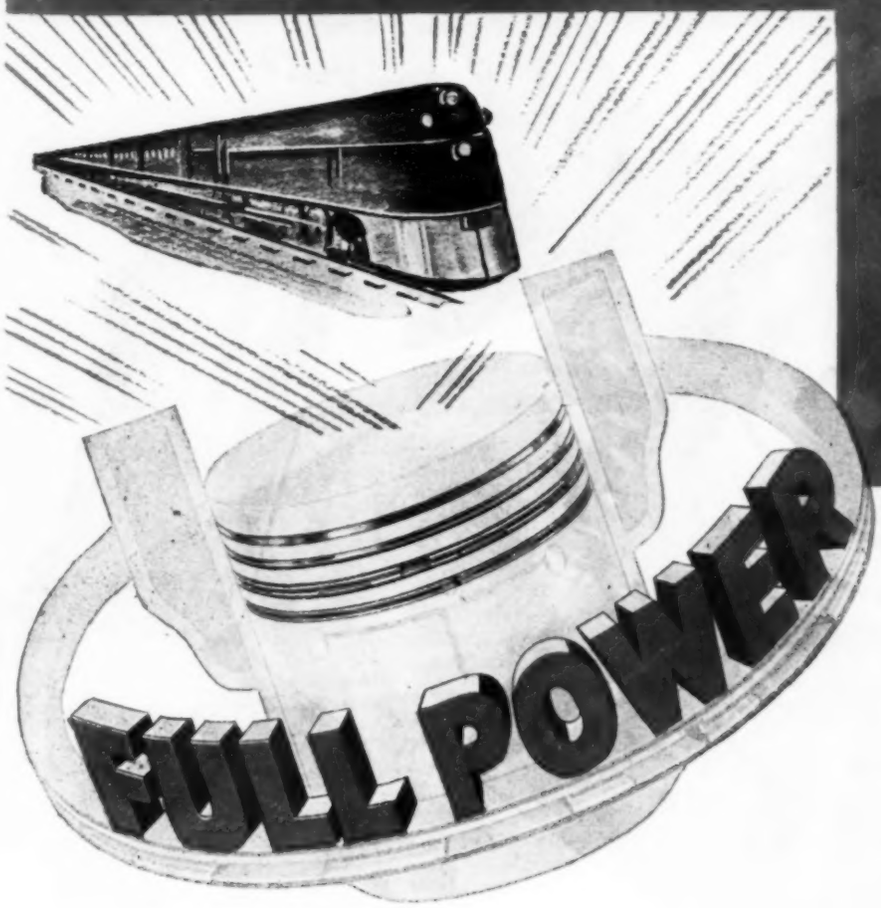
TRADE MARK

*In Business for Your Safety*

6-235 General Motors Building, Detroit 2 • 695 Bryant Street, San Francisco 7

AUTOMOTIVE AND AIRCRAFT DIVISION
AMERICAN CHAIN & CABLE • BRIDGEPORT

# Now FULL POWER For WORN MOTORS



*TOMORROW'S RINGS TODAY*

**MOOG**
***X-PLUS***
**PISTON RINGS**
U. S. Pat. 1,771,198

INSTALL Moog X-Plus FULL POWER Piston Rings in every re-ring job to insure FULL POWER results.

This modern, new style piston ring set-up restores motor performance, controls oil and prevents blow-by — *eliminates costly comebacks.*

A different type ring for each groove — each ring has its job and does it — delivers FULL POWER. Write today for FULL POWER Story and new streamlined catalog.

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*General Offices:* 6650 EASTON AVE., ST. LOUIS 14, MO.
*Warehouses in principal cities*

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**For Complete Spring Suspension Look to Moog for Leadership**

MOOG ELECTRICALLY HEAT TREATED SPRINGS

MOOG COIL ACTION REPLACEMENT PARTS

**Springs Where Springs are used. Coil Action Where front end parts are used.**

*Any way you Look at it...*

# A BLACKHAWK JACK IS YOUR BEST BET!

NO doubt about it! From sleek, efficient design to in-built guts, Blackhawk Hydraulic Jacks have that superior quality that distinguishes a leader. Brute power, precise control, dependability under all conditions — these are Blackhawk service-proved characteristics that make them the predominant choice of fleet and bus operators, and the automotive, aviation and industrial fields. That's why year after year, Blackhawk Hydraulic Jacks are found in the big majority of the shops that receive the annual Bus Maintenance Awards. Wherever uncompromising performance is demanded, you'll find Blackhawks. That's why Blackhawk Hydraulic Jacks are YOUR best bet!

*A Product of* **BLACKHAWK MFG. CO.,** Dept. J725, Milwaukee 1, Wis.

This seal is found ONLY on BLACKHAWK HYDRAULIC JACKS—your assurance of a wise and safe investment.

# BLACKHAWK

FLEET OWNER

DEVOTED TO THE BETTER OPERATION AND MAINTENANCE OF ALL AUTOMOTIVE FLEETS

Vol. 34, No. 2—February, 1945

# WASHINGTON REVIEW

*(The Editor's Column)*

## ODT REPORTS ON TRUCKS

● Less than one fourth of the motor trucks estimated as needed to meet essential war and civilian transportation requirements during 1945, will be produced and distributed to commercial operators, ODT announced recently. . . . This estimate is based on the 1945 civilian truck program approved by WPB, and detailed elsewhere in this issue.

Increased demands by the armed services for all types of motor transport was given as the chief reason for the severe reduction. The total authorized program amounts to 186,792 light, medium, light-heavy and heavy-heavy trucks, or 24.1 percent of the ODT stated requirement of 773,935 vehicles.

To emphasize the present and future increased needs of the armed services for more and more motor transport, ODT pointed out that the approved 1945 program is also sharply reduced from previous allocations tentatively approved for the first six months of 1945. The final authorization is only four-fifths as large as the total of 235,905 trucks that earlier allocations made last summer and fall indicated as the possible 1945 schedule.

ODT also pointed out that the 1945 production schedule for medium, light-heavy and heavy-heavy trucks will be held to slightly below the fourth quarter (1944) rate of production. The total for 1945 in the final program in these sizes is 151,088. At the 1944 fourth-quarter rate, the total production would be 151,876 trucks.

The requirement estimate of 773,935 vehicles, ODT explained, represents the number of vehicles required to meet the need for essential trucking transportation purposes. To obtain new vehicles, truck operators must show that the vehicle will be used in operations directly related and necessary to the war effort or the maintenance of essential civilian economy, as before.

In allocating a share of the total national production of trucks to ODT, WPB made the largest reduction in the number of light trucks authorized, the total, 35,704, being only 11.9 percent of the ODT requirement estimate of 299,600.

ODT said the reduction will be particularly felt by farmers and dairy producers, because no light trucks have been made since January 1942, when production was halted, except for vehicles then on assembly lines. Furthermore, the pool of light trucks that was set up after the freeze order has been virtually exhausted for almost a year.

Users of light trucks were warned by ODT that the small number of vehicles that will be available and the growing age of the vehicles now in service will make conservation and preventive maintenance measures more necessary than ever.

Heavy reductions were also made in the number of medium, light-heavy and heavy-heavy trucks approved for production, the percentages approved, compared with requirements being 31, 32.4 and 42.2 percent respectively. Production of these trucks ceased in March, 1942, and was not resumed until late in 1943.

In comparing the final authorization with the tentative 1945 program, the largest reductions were made in the light-heavy and heavy-heavy truck categories. According to the earlier tentative program, the annual figures would have been: Light trucks, 38,132; medium, 134,901; light-heavy, 49,750; and heavy-heavy, 13,122. The percentages received in the final authorization were respectively 93.6, 81.3, 63.2 and 74.5 percent of the earlier tentative estimate.

However, the 1945 program com-

# WASHINGTON REVIEW ....

Continued from Page 57

pares favorably with the 1944 truck production program, which totaled 101,357, divided as follows: Medium, 73,475; light-heavy, 20,069; and heavy-heavy, 7,813. The bulk of these vehicles, ODT stated, were built during the third and fourth quarters of 1944.

●

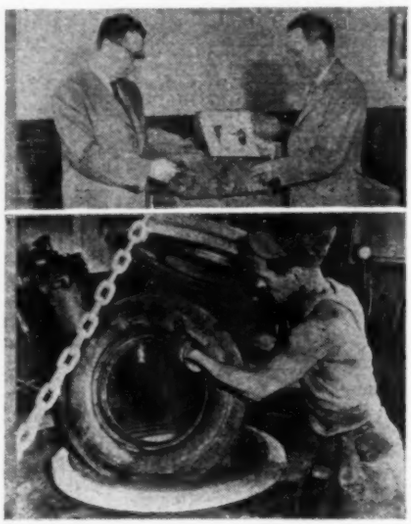
## CIVILIAN TRUCK PRODUCTION

● Last month we gave you, on page 57, a breakdown of the revised 1945 *civilian* truck production figures, which represented a cut of about 30 percent from the schedule approved before the renewed German drive into Belgium and France. . . . Fortunately, that set of figures still stands at this writing (Jan. 27th).

For your convenience, here is a recapitulation of the schedule: In 1945, a total of 245,449 civilian trucks will be built, for domestic and export uses. For domestic there will be 188,883; for export and other uses, 56,566. . . . The breakdown as to types of vehicles, i.e., light, heavy, etc., given on page 57 of our January issue, still stands.

WPB officials stated that company quotas would be announced as soon as they have been set. They pointed out that it has been necessary, despite the very urgent needs for commercial trucks, to establish as a basic policy in the production of 1945 trucks, the principle that in the event of conflict between the production of military trucks and commercial trucks, all possible steps shall be taken to see that the military production is accomplished "at the expense" of non-military programs.

WPB admits that this schedule represents a "bare minimum", sufficient to keep in operation a domestic transportation system depleted by another year of wear-and-tear under the rigors of wartime conditions. . . . All of this, however, is subject to change with the fortunes of war. At this moment it looks like we will get *more* trucks than the schedule provides; but one can never tell.



HERE's the first of new tires to be made of Russian dandelion rubber. . . . In the top picture two Goodrich research men examine some bales of the U.S.-grown product; they say its comparable to plantation rubber.

●

## BUSES, TRAILERS, 3RD AXLES

● Authorization of the construction of 8,833 integral buses to meet essential passenger transportation needs during 1945 was announced last month by ODT, following a program determination made by WPB.

ODT at the same time announced WPB approval for the construction and manufacture of 19,304 commercial trailers and 2,961 third axles in 1945. . . . The announcement provided quarterly production schedules, which are as follows:

*Integral Buses:* 1st quarter, 2,513; 2nd quarter, 2,125; 3rd quarter, 2,120; 4th quarter, 2,075. Total, 8,833.

*Commercial Trailers:* 1st quarter, 6,500; 2nd quarter, 4,268; 3rd quarter, 4,268; 4th quarter, 4,268. Total, 19,304.

*Third Axles:* 1st quarter, 1,200; 2nd quarter, 586; 3rd quarter, 589; 4th quarter, 586. Total, 2,961.

ODT's estimated *requirements* for the above for the year of 1945 were 10,000 buses, 50,000 trailers and 4,800 third axles. The above figures, however, tell you just what they may get.

●

## TRUCK STEELS FREED

● Special limitations on the use of iron and steel in truck and trailer bodies have been removed through the revocation of Order L-253, WPB announced last month.

However, amendment No. 4 to Order M-126, also issued, prohibits the use of stainless steel in truck and trailer bodies, except in milk trucks and refrigerator-type trucks. . . . Iron and steel available for truck and trailer bodies, other than stainless steel and galvanized sheets, will still be subject to the regular CMP allotments by WPB's Requirements Committee.

●

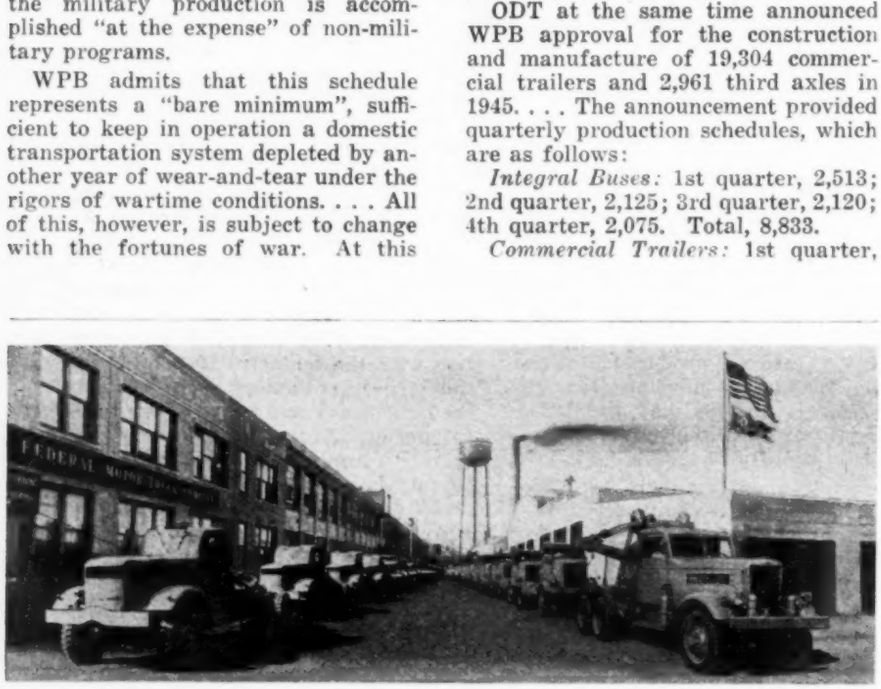
## LOW OCTANE GAS GENERAL

● The gasoline sold in service stations throughout the United States during the summer of 1944 had lower octane ratings than the gasoline sold in the summer of 1943, according to the semi-annual survey of motor gasoline released recently by the Bureau of Mines.

Analyses of 894 service station samples, representing products of approximately 90 companies in 21 marketing areas of the nation, disclosed that premium-grade gasoline sold during the summer of 1944 had an average octane-number of 75.0, regular-grade gasoline an average of 71.1, and third-grade gasoline, an average of 55.1. The 1943 summer survey showed an average of 79.1 for premium grade, 72.0 for regular grade, and 61.2 for third-grade gasoline.

Inaugurated in 1936, the semi-annual motor gasoline surveys of the Bureau are made in cooperation with the Coordinating Fuel Research Committee, Dr. R. R. Sayers, Bureau Director, reported to Secretary of the Interior Harold L. Ickes. . . . The information for the current survey was compiled by O. C. Blade, associate petroleum chemist at the Bureau's Petroleum Experiment Station, Bartlesville, Okla.

Included in the survey are data on gravity, sulfur content, Reid vapor pressure, octane-numbers, and distillation range for premium-grade, regular-grade, and third-grade motor fuels sold in 21 marketing areas of the country.



BADLY needed by our battle forces on the Western Front for moving up supplies and other services, these giant heavy-duty trucks will probably prove a welcome sight when they arrive in France. . . . The picture was taken outside of the Federal Motor Truck factory in Detroit. . . . Frequent shipments like this one are what it will take to do this toughest job.

# Studebaker salutes

# *America's Laundry Industry*

*Laundries are making an annual saving of 380,000,000 truck miles and 34,000,000 gallons of gasoline!*

THE Office of Defense Transportation has thanked the laundry industry for its "splendid spirit of cooperation" in achieving a 40 per cent reduction in truck mileage.

Studebaker joins with ODT in commending America's laundries for a great job well done.

Before the war, according to the American Institute of Laundering, the laundry industry's 53,000 trucks traveled about 950,000,000 miles annually, yet, last year, in compliance with the national need for conserving trucks, tires and gasoline, the laundries handled 165,000,000 more family bundles than in 1940—and in doing so, saved 380,000,000 truck miles and 34,000,000 gallons of gas.

In giving 12,000,000 U. S. families this extra service, the laundries have made it possible for 1,500,000 women to go into war work and other vital home front activities. And don't forget, the laundries have also been doing 85 per cent of the laundry of the Army Air Forces in addition to 55 per cent of the laundry of the Army Ground Forces.

**Laundries and other truck operators find Studebaker's handbook helpful**

As one of its many continuing wartime public services, Studebaker published a handbook of information on motor truck care last year that was highly praised and widely used by truck operators in many varied lines of business.

In response to popular demand, a new 1945 edition of that handbook is now ready. It contains 48 pages of timely information on how to maintain all makes of motor trucks and improve their performance. You can get a sample copy free from any Studebaker car or truck dealer or by mailing the coupon below.

**MAIL THIS COUPON NOW!**

**Studebaker Truck Division, Dept. FO-21, South Bend 27, Indiana**

Please forward free and postpaid sample copy of "Maintenance Information for the Delivery Truck Operator."

*Name* .....

*Firm* .....

*Address* .....

*City* ..... *State* .....

## STUDEBAKER

*Pioneer and pacemaker in Automotive Progress*

BUILDER OF WRIGHT CYCLONE ENGINES FOR THE BOEING FLYING FORTRESS—HEAVY-DUTY STUDEBAKER MILITARY TRUCKS—THE WEASEL PERSONNEL AND CARGO CARRIER

# WASHINGTON REVIEW . . . .

*Continued from Page 58*

## ODT NEEDS MET IN '44

● Production of civilian transportation equipment was larger in 1944 than in 1943, ODT recently announced, in spite of heavy military demands and shortage of manpower; but it remains on a level far below that of pre-war years for many items. . . . As claimant agency for domestic transportation under WPB's controlled materials plan, ODT succeeded in getting into production nearly its full program for the year just passed.

Production of trucks of various sizes, including bus chasses, showed a notable increase, with 96,084 produced, out of 101,000 scheduled, as compared with 2,699 produced in 1943. . . . This production for civilian use is small, however, when it is considered that average production in the years just preceding the war was 600,000 trucks per year, for civilian use within the United States. . . . Of integral buses, 5,150 were produced in 1944, as compared with 1,546 in 1943.

With no passenger automobiles being produced since the spring of 1942, and manufacture of trucks and buses being resumed on a small scale only in the fall of 1943, the ODT has been concerned with keeping all existing vehicles rolling. . . . It has exerted constant pressure for the manufacture of new automotive replacement parts. As a result of this, the ODT reports the manufacture of nearly $800,000,000 worth of such parts in 1944. This is an all-time record. Prewar production never went much over $600,000,000 annually. With old cars, old trucks, and old buses carrying heavy traffic essential to the war effort, these new parts help to make up for the lack of new vehicles.

●

## NEED MILEAGE RECORD

● All operators of passenger-cars with basic "A" rations must have "mileage rationing records" to be eligible to apply for any other gasoline rations, OPA recently warned. . . . In the recent re-registration of the nation's 23 million basic "A" ration holders, each registrant was issued one of these mileage record forms. The form replaced the old tire rationing record, on which was kept a list of all gasoline rations issued to the vehicle.

Without this important record form, no motorist may be issued a "B" or "C" supplemental ration, OPA emphasized.

Information has been received from local war price and rationing boards that many motorists did not understand the use of the record form and lost or destroyed theirs.

No supplemental rations or special or furlough rations for cars with basic "A" rations may be issued to an applicant who does not present his mileage rationing record with his supplemental gasoline application, OPA emphasized. In cases where a motorist was not issued a mileage rationing record, or it was lost or destroyed, he should immediately apply to his local board for a duplicate.

HOW tanks reach the front. . . . This U. S. Signal Corps photo at a behind-the-lines supply depot shows three Fruehauf M-25 tank transporters ready to move their loads. . . . Each tank transporter carries two M-5 light tanks, destined for use on the Western Front. . . . The infantry is not the only battle unit moved into front lines by truck, all ready for combat.

●

## MORE PREMIUM FUEL

● United States refiners will be able to increase slightly the quantity of premium motor fuel that can be manufactured for buses, fire engines, ambulances, large trucks and other essential vehicles, PAW recently declared.

Action was taken by issuing Amendment 3 to Petroleum Distribution Order 21. The amendment became effective on January 1, 1945. . . . Discussing the terms of the amendment, Administrator Ickes said:

"As a result of this action, refiners will be able to manufacture a slightly larger quantity of premium motor fuel than was permitted during December. . . . However, this does not mean that civilian motorists will be able to obtain additional quantities of premium gasoline, as the total increase granted by the amendment is not expected to exceed 60,000 barrels a day for the entire country. . . . It is intended that most of the increase will be consumed by essential vehicles."

MACK's new 41-passenger city-type bus is shown here in miniature model, surrounded by factory executives. . . . The new bus has larger engine, hydraulic torque converter, new heating and ventilating.

●

## TRUCKING IS "ESSENTIAL"

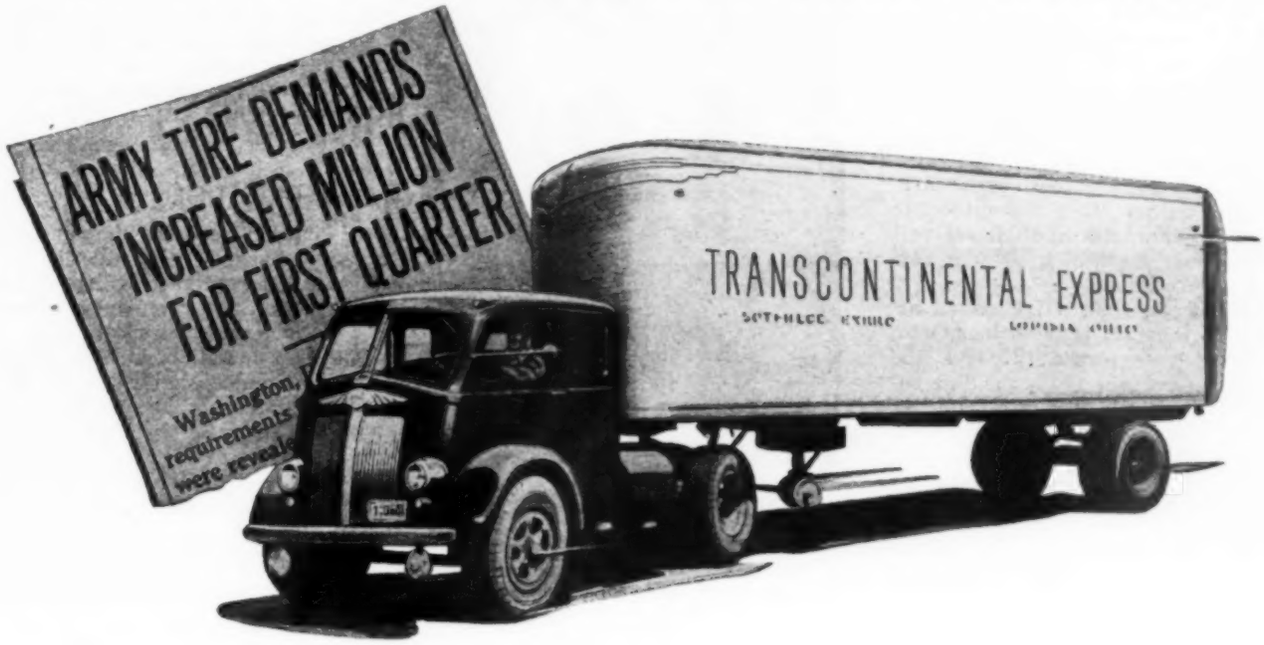
● In the list of "essential" and "critical" industries sent by National Headquarters of Selective Service, to its local boards, which was prepared by WMC, over-the-road trucking is listed as "critical". . . . This means that employees in that branch of truck transportation are to be so considered by local draft boards. . . . In the new listing, over-the-road trucking is slated as a "critical" industry, whereas in the old one, it was simply classified as an "essential" one. . . . Men of the ages from 26 through 29 are now sought for military services. . . . If you have any such men who are absolutely "indispensable", better try for a replacement—or else follow through with your local board to see how long you will be able to keep them in your services.

●

## REVOKES MILEAGE LIMITS

● The mileage limitation on the delivery of butter and cheese by a creamery or cheese factory to a retail store by means of a common or contract carrier, has been abrogated in the Rocky Mountain area, OPA announced recently. . . . (This is contained in Amendment 19 to MPR 289, effective Jan. 10, 1945.)

# THE MOST CRITICAL TRUCK TIRE MONTHS OF THE ENTIRE WAR ARE HERE




## Now you Must save the Carcass to save your Business . . . and

# GENERAL TIRE DEALERS ARE READY TO HELP YOU GET OVER THE HUMP

If you have thought the tire crisis was bad . . . but were getting by . . . this is a serious warning that the next few months will determine whether your trucks will continue to roll or will have to be laid up for lack of new tires.

Recognizing that it all depends on saving the carcasses of tires now on trucks, General Tire Dealers are working their recapping shops day and night, giving priority to trucks lacking adequate spares and scheduling truck tires ahead of passenger tires.

With comprehensive coast-to-coast tire facilities . . . with the Kraft System, original factory-control recapping method exclusively in their shops . . . with factory-trained tire experts and the most modern equipment . . . General Tire Dealers are best equipped to help you maintain new tire mileage and to add thousands of miles to worn casings . . . *and they are ready* to help see you through.

The GENERAL TIRE

*Twin Signs of Top-Quality*

GENERAL TIRE KRAFT SYSTEM RECAPPING

KRAFTRED

**THE GENERAL TIRE & RUBBER COMPANY**
**AKRON, OHIO**

# WASHINGTON REVIEW ....

Continued from Page 60

## CWN GOOD INDEFINITELY

● In response to inquiries being made by commercial motor vehicle operators, the ODT stated that Certificates of War Necessity are good indefinitely until canceled, and need *not* be renewed on an annual basis.

Under ODT regulations, operators do not have to have their certificates reissued unless they propose to change the character of their services or territories for which present certificates were issued.

At the same time, ODT called attention to the fact that on last October 15, it transferred to OPA the handling of certain of its gasoline ration functions relating to temporary allotments of gasoline.

Under this transfer of duties, OPA now is responsible for the collection of gasoline ration coupons or checks in the hands of operators at the close of the quarter for which they were issued. . . . For this reason, commercial motor vehicle operators should turn in all quarterly rations on hand at the end of each quarter to their OPA Local War Price and Rationing Boards, instead of to ODT district offices. Such surrender must be made not later than the fifth of the month.

●

## TUBES NOW OF BUTYL

● Butyl synthetic rubber may now be used in the manufacture of tubes for light trucks, as well as the larger truck tube sizes, WPB announced last month. . . . The new regulation applies to tubes for both government and civilian use in sizes 6.00 x 17, 6.00 x 20, 6.50 x 17 and 6.50 x 20.

Tubes in the four light truck sizes have been manufactured from Buna-S, the general-purpose synthetic rubber, because the supply of butyl was insufficient.

The use of butyl inner tubes in the sizes specified will make available better tubes for the users of light trucks. Butyl is the synthetic best adapted for use in tubes and is superior to crude rubber in its resistance to air leakage, WPB said.

The new expansion in the use of butyl for inner tubes is the second since November 9, 1944. Butyl has been permitted for tubes only in very large truck and bus sizes down through and including 7.00 cross-section.

●

## CAMELBACK RESTRICTIONS

● Effective January 1st, WPB issued an order (which has been but little publicized) directing camelback manufacturers to cease using Grade-A camelback for passenger-car tire sizes.

The order says that no more Grade-A stock shall be made up in passenger-car "die" sizes. Which means that trucks using passenger-car sizes will also be unable to get the good camelback when present stocks run out. As it reads, Grade-A camelback may now only be made in crown-width of 5¼" or larger, and 14/32" gauge or heavier . . . Grade-C camelback will probably be the best that will be available for passenger-car and light truck recapping, when present stocks of the good stuff run out.

The idea behind this was to save on carbon black. However, the saving will be made at the expense of manpower, because this will eventually result in more recapping having to be done—sooner and oftener.

Rumor has it that, unless they find some way to get rid of the huge stock of rubber that has been reclaimed to-date, an order might be issued making it mandatory to use Grade F (reclaim) camelback for all passenger-car and light truck tires. We hope not.

NOT hats, but stampings that will later become Army black-out lamps. . . . This picture was snapped in the Cincinnati plant of Auto-Lite's Lamp Division, where they are making thousands and thousands of 'em.

●

## CAR TIRES TIGHT

● WPB recently announced that passenger-car tire production in the first quarter of 1945 will be 3 million tires *less* than previously scheduled, in order to use more cotton tire cord in the production of military tires. . . . It is estimated that the tire industry will be able to make 5 million passenger-car tires in the first quarter of 1945.

Further cuts in the allocation of new tires for civilian passenger-cars and small trucks for February and March were forecast by President Williams of the Automobile Merchants Association of New York. . . . Mr. Williams does not believe that there will be any new tires for "A" gas book holders until October or November of 1945 at the very earliest, unless the military situation greatly changes in the meantime.

●

## ELECTRIC MOTORS EASIER

● Despite heavy military demand for fractional horsepower motors, some increase in output is making it possible for manufacturers to ship several thousands each month for essential farm and civilian replacement uses, WPB announces. . . . Repair shop owners are advised to shop around for suppliers who can fill their orders, and to urge suppliers to file an application with WPB each month for allocation of small motors.

TAKES the wheel. . . . Ted V. Rogers, president of American Trucking Associations, is seen here greeting J. W. Lennon, manager of the Tennessee Motor Transport Association, with a warm hand-shake in front of the state association's headquarters, at the recent Nashville convention, while four Southern gals look on. . . . The job pictured is a Federal tractor.

# VALVOLINE eliminates unusual motor wear in 1300 Unit Fleet

OVER TWENTY FIVE YEARS OF PROGRESS

Commercial MOTOR FREIGHT

ADMINISTRATIVE OFFICES, 315 EAST LONG STREET
Columbus, Ohio 16

January 6, 1945

WRITTEN FROM

Valvoline Oil Company
1761 Elmore Street
Cincinnati, Ohio

Attention: Mr. J. J. McGraw

Gentlemen:

For the past four years, we have been a consistent user of Valvoline Oil in our entire fleet and this has proved uniform and satisfactory.

When we first started the use of Valvoline Oil, we used regular Valvoline and later changed to Valvoline H.P.O. Oil, which we have found to have eliminated unusual motor wear, and this, combined with the untiring efforts of your Valvoline Fleet Laboratory Analysis, has been a great factor in our Preventive Maintenance Program.

From a standpoint of fleet operation, Valvoline H.P.O. Oil can and will do a well balanced job of performance.

Yours very truly,

COMMERCIAL MOTOR FREIGHT, INC.

E. Bonaria
President

Operating under heavy wartime schedules, America's fleet operators are turning more and more to the proven plus-protection of Valvoline, the first Pennsylvania oil. Valvoline quality and Valvoline Fleet Laboratory Service can stretch the mileage and shrink the maintenance cost of every unit in *your* fleet, too. Write your nearest Valvoline office today!

**VALVOLINE OIL COMPANY**
579 EAST FIFTH STREET CINCINNATI 2, OHIO
New York-Chicago-Atlanta-Los Angeles-Vancouver
REFINERY IN PENNSYLVANIA

COSTS MORE TO MAKE—COSTS LESS TO USE

# VALVOLINE

The 1st Pennsylvania Oil

# WASHINGTON REVIEW . . . .

*Continued from Page 62*

## PREVENTS GAS MARK-UPS

● Suits have been filed in Chicago and Los Angeles by OPA, as part of a concerted drive to prevent the sale at premium gasoline price ceilings, of lower grades of gasoline, to which other substances have been added, OPA recently announced. . . . OPA claims that the practice of adding lubricants and other ingredients to standard gasolines—and getting more money for them—is a price ceiling violation. . . . The sale of regular and third-grade gasolines (without any additives) at premium ceiling prices is, of course, unquestionably a violation of OPA ceiling laws, and this type of violation is also being strictly checked by OPA officials.

●

## 10-TON JACKS AVAILABLE

● Treasury Procurement Division is selling "used" Army hydraulic jacks of 10-ton capacity for civilian use at ceilings—wholesale and retail—set by the OPA. . . . The ceilings are: $70 on sales by manufacturers to jobbers or distributors; and $100 on sales by any seller to consumers. . . . No estimate is available of the number of these jacks being disposed of for civilian use. They are of the roller type and are new, having been acquired by the Army in 1941 and 1942, but never used.

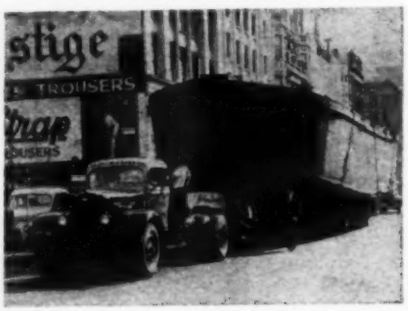
●

## HOW LAUNDRIES SAVE MILES

● Col. J. Monroe Johnson, director of ODT, thanked the laundry industry recently for its "splendid spirit of cooperation" in abiding by ODT regulations and achieving a forty per cent reduction in truck mileage.

Colonel Johnson's statement was made in connection with a report by Forest I. Neal, president of the American Institute of Laundering, which showed that the laundry industry is making an annual saving of approximately 380,000,000 truck-miles. . . . Before the war, the industry's 53,000 trucks traveled about 950,000,000 miles annually. Mr. Neal estimated that the industry is also saving more than 34,000,000 gallons of gasoline annually.

Commenting on this conservation achievement, Colonel Johnson told Mr. Neal that "with the expressed assurance of your continued cooperation, there is no doubt that our common aim and purpose will be attained."




THIS is an 85-foot, 70-ton barge being hauled through the streets of an Australian city, en route to the coast. . . . Motor transport, such as this White, enables them to build 'em far inland.

●

## TIRES—$30 PER TON

● Used C-1 tires no longer fit for Army service, which are to be sold by the government for civilian use, now have a ceiling price of $30 per ton, f. o. b. shipping point on sales by the government to manufacturers. The ceiling is $40 per ton on sales by manufacturers to tire dealers.

Tire manufacturers are expected to sell the tires to dealers, vulcanizers and recappers for repair and resale to the public. Present ceiling prices on used tires will apply on sales to consumers; these vary, of course, according to the condition of the tire.

●

## MOTORCYCLES AVAILABLE

● Distributors of motorcycles may now receive delivery from manufacturers and may file applications on Form WPB-1319 for authorization to deliver motorcycles to certain specified civilian users, WPB recently announced. . . . Such civilian uses are confined to public and private police, delivery service both within and without war plants, and certain other specified services. . . . Refer to Limitation Order L-331, at any WPB office, if interested in more details.

●

## NO GAS RELAXATION

● Germany's continuance in the war makes impossible any relaxation of civilian gasoline rationing, the Petroleum Industry War Council was informed recently by its committee on petroleum economics. . . . After taking into account the substantially increased military requirements, civilian supplies are indicated as barely adequate to meet requirements on the present rationed basis and this obviously precludes any relaxation of rationing as long the Germany remains in the war.

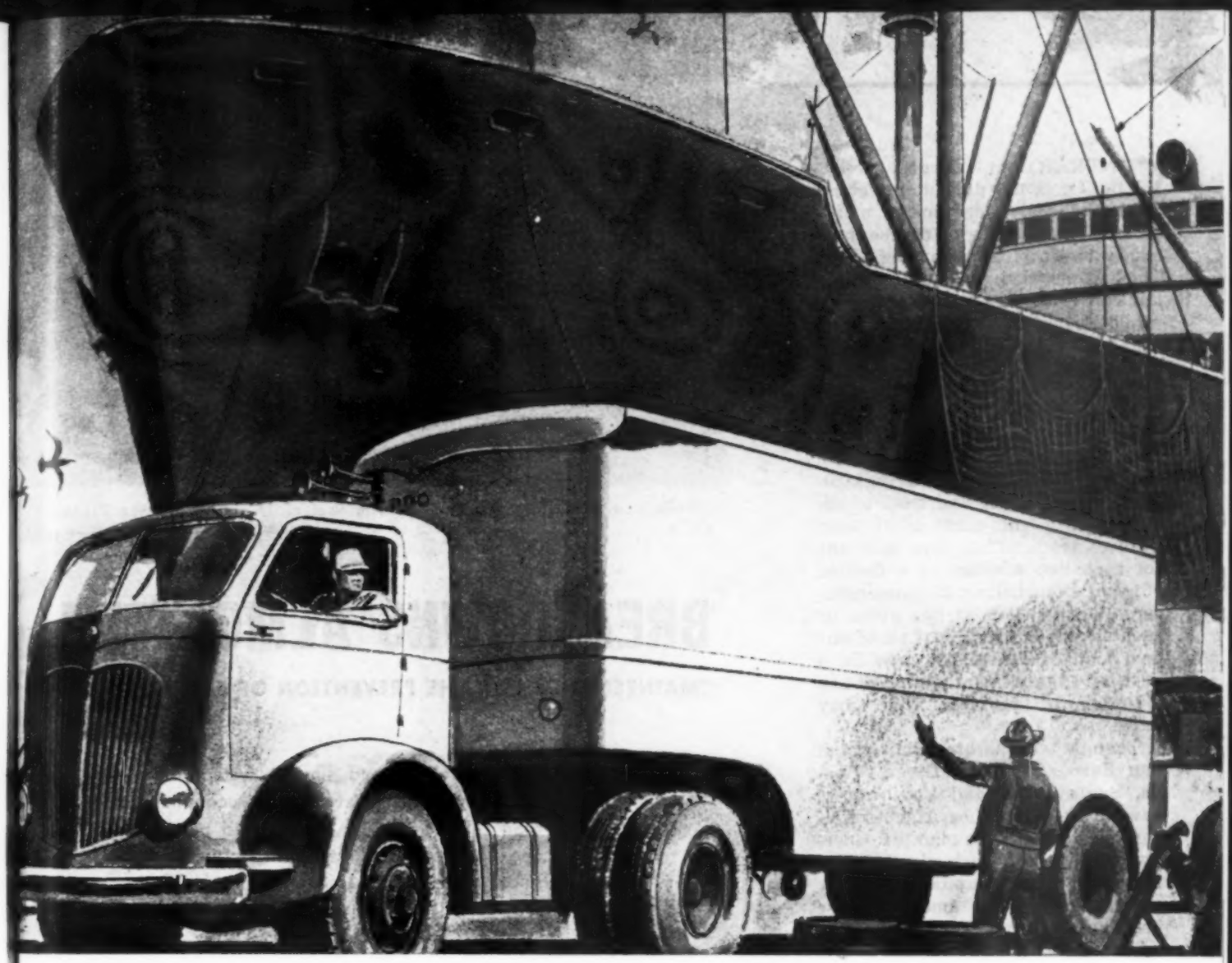
●

## WRENCH SETS PERMITTED

● Manufacture and sale of wrench sets are permitted for inventory and shelf stocks of producers and distributors, by an amendment to Schedule II of WPB Order L-216, issued last month, the Tools Division of WPB has announced.

GIRLS drive Borden milk trucks in war-busy Dayton, Ohio, and do it safely, too! . . . These five gals have piled up unusually high "points" in Borden's system of recording milk deliveries. They perform most all the tasks usually done by male drivers.

GIRLS also drive Borden horse-and-wagon outfits, in Dayton, Ohio, as this photo shows. . . . Meet Marie Boye, an accomplished horse-woman (the riding kind) who asked for the horse-and-wagon rig, and who is making high "points" in milk delivery.



# DOWN TO THE SEA IN TRUCKS

Filling the yawning bottoms of thousands of waiting ships is one of the trucking industry's greatest contributions to the war effort. How well this job has been accomplished is evidenced by the ceaseless flow of vital materiel to the widely scattered fighting fronts of the United Nations ★ Here is a new and glorious chapter of America's transportation progress being written before our very eyes and one which will weigh heavily in forcing the ultimate peace ★ For a task well done, Bendix-Westinghouse salutes the industry as a whole and appreciates the heavy role it has been privileged to play in furnishing a dependable power-to-stop which so adequately fulfills the slogan, "Safety Standard of the World." ★ Fighting now for Victory, Bendix-Westinghouse Air Brakes and Pneumatic Controls await only the coming of peace to bring even greater benefits to the trucking industry which has every right to expect big things from the two greatest names in braking.

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY . . . ELYRIA, OHIO

**Bendix-Westinghouse**

**AIR BRAKES**

**AND PNEUMATIC CONTROL DEVICES**

IT IS SIGNIFICANT THAT AMERICA'S FINEST MOTOR TRUCK FLEETS ARE EQUIPPED WITH BENDIX-WESTINGHOUSE AIR BRAKES

HERE's part of the big Knudsen Creamery fleet of 161 units, including 21 cars.

# BREAKDOWNS ALMOST NIL

## "MAINTENANCE FOR THE PREVENTION OF FAILURES" is the

**BY following a practical (and simple) system of preventive maintenance, this fleet of 161 units has reduced its road failures from an unrecorded number to less than one for each two vehicles per year, after three years of preventive maintenance work.—Editor.**

CONTRARY to the general belief, it is not difficult to set up a comprehensive preventive maintenance plan. It is, of course, necessary to establish a starting point. This, we decided, was to determine the *causes* of trouble. Prevention would then naturally follow the general rules of good mechanical procedure.

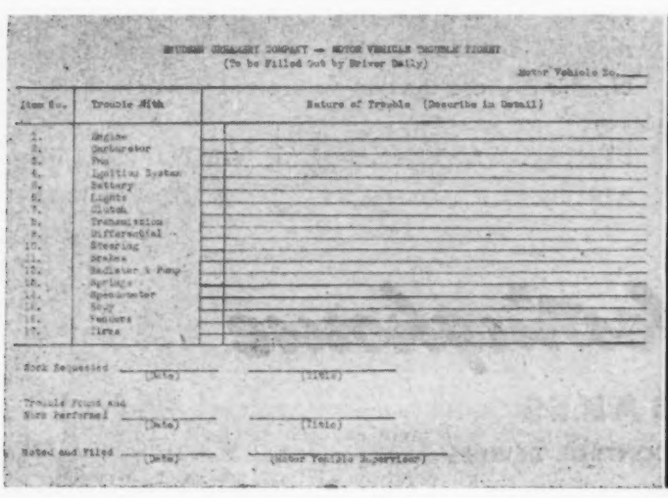
This "maintenance for prevention of mechanical failures" plan went into effect in our fleet about three years ago. It has proven its worth in substantial savings in gasoline, oil, parts, and most of all, in reducing the number of road failures from "?" to less than one for each two vehicles, in a fleet of 161 units, including 21 passenger-cars. In addition, it has given us such a complete record of all of our operations that we are now in a position to intelligently analyze any maintenance problem that may arise.

Though we operate branches at San Bernardino, San Diego, Visalia, Santa Maria and Ventura, we have not put this Los Angeles preventive maintenance plan into operation at these branch plants. The reason, the total number of motor vehicles divided among these branches does not warrant it. So, minor services and repairs are made by outside shops and the vehicles are driven into our Los Angeles headquarters when complete overhauls, body rebuilding or repainting becomes necessary. This has been found to be very satisfactory and apparently the most economical, at least so far. The average monthly mileage for the Los Angeles fleet is 120,000 miles, or slightly over that, in the aggregate.

Drivers' reports are the basis for our preventive maintenance program and they are run off on the office mimeograph in small lots and changed as conditions warrant. This holds the cost to a minimum and, at the same time, makes these forms more flexible, over commercial printing in larger lots, as is done in many other fleets. Major items of possible trouble are listed on this form, (which is illustrated below) and the driver checks and explains in short form all of the details.

When accidents occur on the road, the driver is obliged to make out a report for insurance purposes. Once a month a meeting is

THE driver's report is typical; note that it lists all major units.



(To be Filled Out by Driver Daily)

Motor Vehicle No.

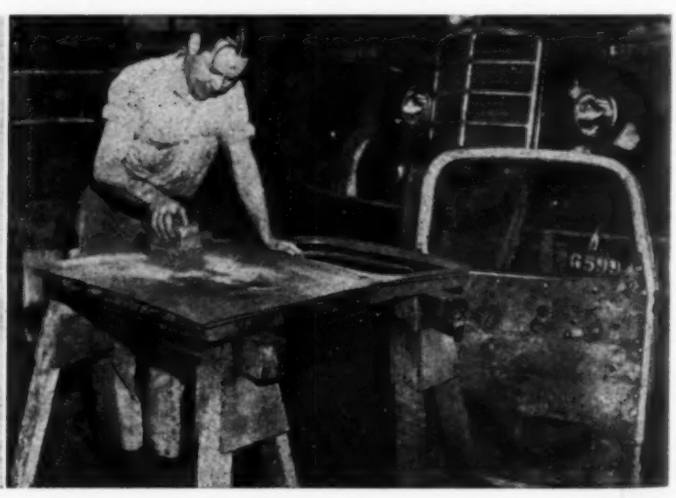
| Item No. | Trouble With | Nature of Trouble (Describe in Detail) |
|---|---|---|
| 1. | Engine | |
| 2. | Carburetor | |
| 3. | Fan | |
| 4. | Ignition System | |
| 5. | Battery | |
| 6. | Lights | |
| 7. | Clutch | |
| 8. | Transmission | |
| 9. | Differential | |
| 10. | Steering | |
| 11. | Brakes | |
| 12. | Radiator & Pump | |
| 13. | Springs | |
| 14. | Speedometer | |
| 15. | Body | |
| 16. | Wheels | |
| 17. | Tires | |

Work Requested (Date) (Title)

Trouble Found and Work Performed (Date) (Title)

Noted and Filed (Date) (Motor Vehicle Serviceor)

OLD doors being salvaged—good example of wartime conservation.



ALL are not of the same make, but you'll note some attempt at standardization.

# AFTER 3 YEARS OF "P. M."

## THEME of SYSTEM ADOPTED by WEST COAST DAIRY FLEET

*By L. T. Sellstrom,*
*Fleet Superintendent,*
*Knudsen Creamery Company,*
*Los Angeles, Calif.*

held by our Safety Committee and it is attended by a representative of our insurance carrier. Accidents and their means of prevention are discussed in detail at these meetings. Once a year pins are awarded to those drivers not having an accident. Another plan in operation is that of placing suggestion cards in cab holders to remind drivers that "vigilance is the price of safety."

Because of our complete maintenance shop, there are few jobs that have to be sent out. These include brake drum turning, radiator repairs and major tire repairs. It has not been deemed profitable to install equipment and add extra help to handle these jobs ourselves; besides, outside sources of supply are still able to render good service on them.

However, we do all our engine repairing including reboring of blocks when necessary. To keep the hole to a minimum size, this is done at .015" taper. When necessa y, a second rebore is given and after that the job gets sleeves to return to standard specifications. Our V-8 motors are sleeved at the first rebore; re-sleeving is thereafter all that is necessary. Shafts are reground, if found necessary, when installing new bearings. Conventional type rings are installed on rebore jobs, but for ordinary overhauls, expander-types are installed, sometimes using two oil rings. This depends a good deal on the type of truck we are working on. Spare or standby trucks, because of their less constant use, get somewhat less consideration than those on regular routes.

Valves are ground after being re-faced and the seats ground. Exhaust valve clearance is increased .002" in severe cases. Fifty per cent increase in clearance and the use of stellite-faced valves has been found necessary in extra severe cases. These complete overhauls are entered on a Repair History Card for each truck. This is a master record and a glance gives the full detailed history.

We salvage everything possible in mechanical parts. This includes all parts—fuel pumps, carburetors, generators, transmissions, driveshafts, etc. We recover door hinges, latches; even the doors themselves. Not a thing is junked

(*Please turn to page* 68)

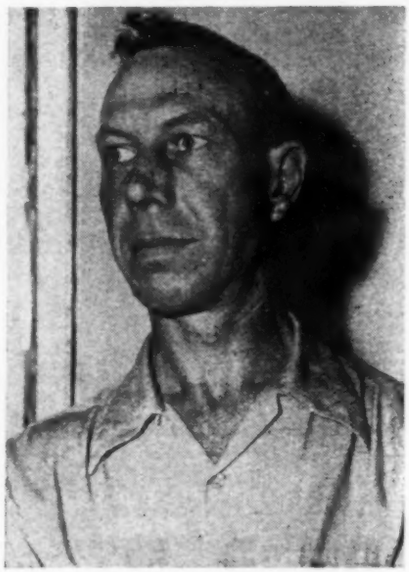
THEY are very fussy on oil-line checks when engines are overhauled.

THIS old transmission is being torn down, prior to reconditioning.

that can be rebuilt or dismantled and the parts used for or with another assembly. All possible methods are used in reclaiming. Sometimes the cost of this salvaging is a bit higher than the cost of a new part; but *try* and get that new part! That is really the important part of our all-out salvage, to keep 'em on the road. Salvaging is frequently a strategic life saver. If a motor is bad, we go clear through it and bring it up to as near normal as possible.

All truck engines have their thermostats set at 180 degrees F. Bypasses are installed on the short-run trucks and those that have long standing waits. These confine the circulating water to the block only until the temperature makes the 180 mark, when the complete circulating system is again in operation. Most of these devices have been installed in our shop, though a few trucks had them when bought.

Our 3,000-mile inspection includes the cleaning and regapping of spark plugs. Cam-angle is set at the same time the distributor is set, on a syncrograph. An electric tachometer is used to set the timing. The time is past when factory specifications can be relied on for this work. This is largely because of the poor quality of gasoline now obtainable. Carburetors are adjusted with an exhaust gas analyzer and generators and regulators are checked and set by an electric test bench unit.



FLEET super Larry Sellstrom, who gives you his preventive maintenance system.

The relining and adjusting of brakes is not done on any definite mileage schedule because it varies, depending on truck route and driver. Linings are worn down faster by some drivers than others because of their brake "technique". On our brake record cards we carry three classifications — "Relined. Good and Fair." This record card is also reproduced within this article. Brake lining condition is usually inspected at least at 5,000 miles, and at most, 8,000 miles. If found in only "Fair" condition, they are marked for relining at a near date. At the time of brake relining, wheel bearings are cleaned and repacked, of course.

We were very fortunate in having in effect a complete tire maintenance program when the ODT and OPA took over. All tires were branded and a complete record of each individual tire was on file. By using a brand number, cross-indexed with truck number, all tires are accounted for and easily located at any time.

Two men are assigned to the tire work. One makes the wheel alignment and checks duals for matching. It is his responsibility that tires are removed at the right time for recapping. This is just before the breaker-strip begins to show. Test has shown that, for us, this is the best time. It gets the tire off the vehicle before any wear has hit the fabric.

Our former tire mileage was 30,000 miles with about 25,000 additional miles for each of two recaps. Now—well, we have no available figures on the new war tires or tires recapped with synthetic camelback as it is now put out. And synthetic tires are still something we hold our breath about. Maybe time will improve them—or something. We still hope.

In our loading and unloading operations we have found, unless drivers are particularly careful, that tires get a bad side scraping. . . . In the past a number of tires were prematurely put out of service because the complete sidewall would be scraped down through two or three plys. We overcame this problem to a great degree by painting the tires with a black tire preservative that shows any contact with curbs. Then, we painted the curbs about the plant in white. Any marks on the tires then are immediately brought to the driver's attention. The fact that we have had no layups of trucks during the war period, due to a shortage of tires, is a testimony of what properly applied tire maintenance can do.

The other man of our two assigned to tire service makes a daily inflation check, installs any missing valve caps, inserts new valve insides when required, and also removes glass or other foreign mat-

(*Please turn to page* 70)

WHEN engines have to be torn down, they do make sure that no wear is overlooked.

ANOTHER conservation step—keeping old trucks running with arc-welded repairs.

# MōPAR

# Water Pump Service Packages

DESIGNED BY CHRYSLER CORPORATION ENGINEERS

ATER PUMP REPAIR KIT

COMPLETE ASSEMBL
READY TO INSTALL

THESE TYPES OF SERVICE PACKAGES COVER ALL WATER PUMP REQUIREMENTS FOR

**PLYMOUTH**

**DODGE**

**DE SOTO**

**CHRYSLER**

**DODGE *Job-Rated* TRUCKS**

## COMPLETE, DEPENDABLE AVAILABILITY

Use MōPar Water Pump Service Packages . . . save time . . . build customer good will.

Whether you have a job requiring a water seal, general reconditioning, or complete water pump replacement, all necessary parts are immediately available, in unit packages. You can promise good, prompt service—and finish the job on schedule.

NOTE TO ALL REPAIR SHOPS

If you need parts of any kind for a Plymouth, Dodge, De Soto, or Chrysler car, obtain them from a dealer for these cars. For Dodge Truck parts, see a Dodge dealer.

REPLACE PARTS ONLY WHEN NECESSARY—CONSERVE FOR VICTORY

THE TRADE MARK "MōPAR" IDENTIFIES PRODUCTS SUPPLIED BY CHRYSLER CORPORATION—PARTS DIVISION

CHRYSLER CORPORATION PARTS DIVISION
MōPAR
TRADE MARK
PARTS AND ACCESSORIES
FACTORY ENGINEERED AND INSPECTED

BUY WAR BONDS

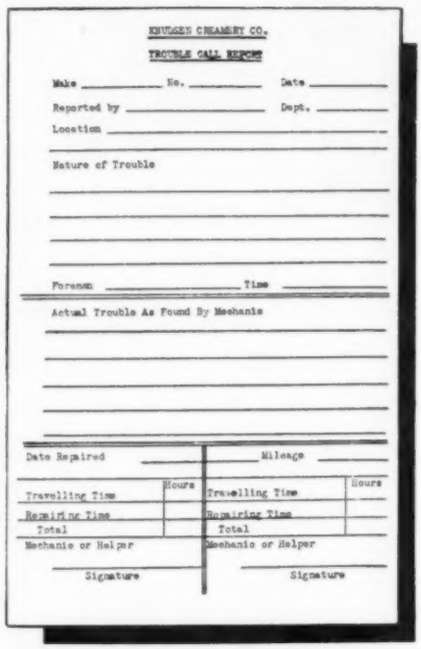
CHRYSLER CORPORATION—PARTS DIVISION, DETROIT 31, MICHIGAN

ter from the tires, including nails. This is most important, as there is considerable broken glass around a plant handling thousands of milk bottles per day, no matter how careful the case-handlers may be.

Lubrication is done at each 1,000 miles with oil-changes at the 3,000-mile mark. The men who gas the trucks check the mileage. If an oil-change or a grease job is due, they mark up the truck for this service the following day. Additives have been found useful in reducing sludge, and oil filters with removable cartridges are used on all of our trucks. Generally, these elements are replaced at each oil-change. However, the condition of the oil governs this and it is watched closely. Crankcases are flushed before oil refills, if and when the oil shows an unusual amount of residue or foreign matter.

Both new bodies and the rebuilding of damaged bodies is done in our own plant. These are of an original type, suited to our particular requirements. Doors are provided on both sides and each body is divided into two or three compartments with a cold unit mounted for refrigeration by means of charged cold-plates that hold the temperatures to 35-40 degrees. Some of the bodies are more than 14 years old and have worn out two chassis. They are built to last, and do.

Because of the milk acids, the painting problem is one of special attention with us. In addition because of the product transported, it is necessary to wash each truck thoroughly daily and this takes a stiff toll in the life of the paint, too. And the cold-plates within the bodies cause a sweating that forms on the outside surface and has been found to be injurious to the exterior paint.



KNUDSEN CREAMERY CO.

TROUBLE CALL REPORT

Make _____ No. _____ Date _____

Reported by _____ Dept. _____

Location _____

Nature of Trouble

Foreman _____ Time _____

Actual Trouble As Found By Mechanic

Date Repaired _____ Mileage _____

| | Hours | | Hours |
|---|---|---|---|
| Travelling Time | | Travelling Time | |
| Repairing Time | | Repairing Time | |
| Total | | Total | |
| Mechanic or Helper | | Mechanic or Helper | |
| Signature | | Signature | |

THE form that's hardly used any more—as a result of three years of good P.M. work.

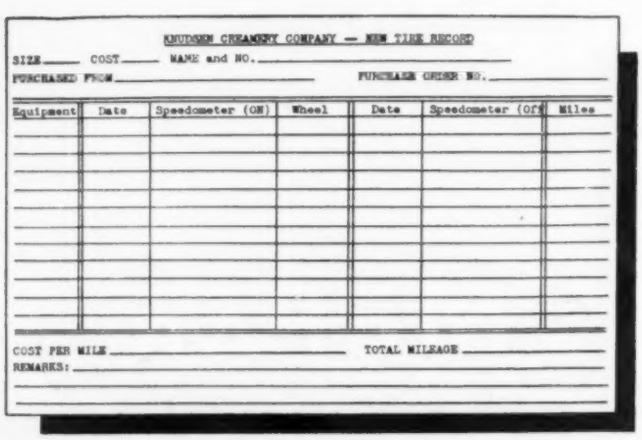
To offset this trouble, we strip off the old paint when a paint job is due, and replace with a tough coat of red oxide primer. On all new bodies we now brush a heavy coat of bitumastic paint on the inside of the steel before applying it to the body. This provides an increased insulation and is a strong factor in the prevention of the sweating condition just mentioned. Following the application of the red oxide primer, it is sanded and then a synthetic enamel is applied. The paint life is about two years.

In order to properly accumulate fleet costs, each mechanic makes out a daily time ticket, charging the particular truck on which he has performed some work. If the work amounts to only a very few minutes, he makes the charge to the fleet and this in turn is spread as an overhead charge to each truck. Every repair part in the shop is marked with its cost at the time of purchase, for inventory purposes and this also serves as the source of the material charge on the particular truck that is being worked on.

We also keep an oil and gas record for each truck for each day of the month. At the end of the month, all of the individual charges for labor, parts, gas and oil are accumulated and charged to the various trucks. The washing and greasing, of course, is spread over the entire fleet and each piece of equipment shares an equal charge. Permanent monthly records are maintained on the operation of each vehicle and of the fleet as a whole, of course.

The shop staff consists of eight mechanics—a machinist, an electrical and carburetor expert, the others all-round men. The body building department is in charge of Paul Fuire. Jim Lawrence is foreman of the paint shop. All of these men have been with the organization for considerable time and it is this, plus the fine teamwork that keeps 'em rolling during the stress of the times.

After three years of preventive maintenance work, we are pleased to note that road breakdowns have almost reached the vanishing point.



KNUDSEN CREAMERY COMPANY — NEW TIRE RECORD

SIZE____ COST____ NAME and NO. _____

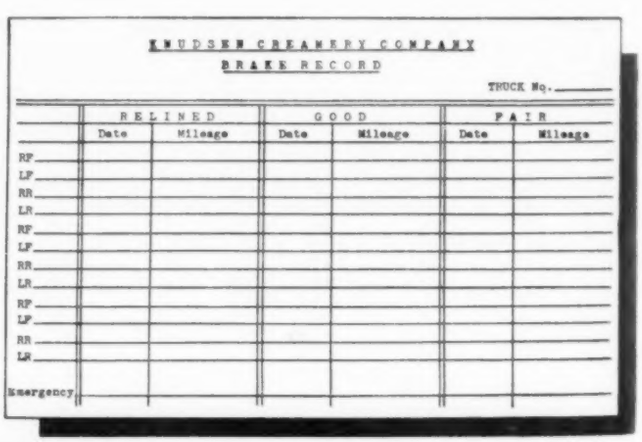
PURCHASED FROM _____ PURCHASE ORDER NO. _____

| Equipment | Date | Speedometer (ON) | Wheel | Date | Speedometer (Off) | Miles |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

COST PER MILE _____ TOTAL MILEAGE _____

REMARKS: _____

MOST fleets have a tire record form something like this. In this fleet they make up their own forms on the office mimeograph outfit.



KNUDSEN CREAMERY COMPANY

BRAKE RECORD

TRUCK No. _____

| | RELINED | | GOOD | | FAIR | |
|---|---|---|---|---|---|---|
| | Date | Mileage | Date | Mileage | Date | Mileage |
| RF | | | | | | |
| LF | | | | | | |
| RR | | | | | | |
| LR | | | | | | |
| RF | | | | | | |
| LF | | | | | | |
| RR | | | | | | |
| LR | | | | | | |
| RF | | | | | | |
| LF | | | | | | |
| RR | | | | | | |
| LR | | | | | | |
| Emergency | | | | | | |

BUT here's a form that is not generally used. It gives Knudsen a record of all brake work done as well as a check on the lining used.

# THESE THREE INTERNATIONAL K-7's

## *HAUL MORE, FASTER FOR LESS*

### A Performance Report by Guden Bros., Inc., Linworth, Ohio

INTERNATIONAL K-7's are light-heavies. Guden Bros., Inc., bought three last June. They have placed a proposal to buy 10 more. Here is their Performance Report:

"Our Company hauls steel out of Wheeling, West Virginia, to Columbus, Ohio, and vicinity. The return is with finished products. The average payload is 13 tons.

"K-7's, pulling trailers that are 24 to 28 feet long and that weigh approximately 3½ tons, make the round trip of 320 miles on from 55 to 57 gallons of gasoline. Seventy-five miles are through mountains. This compares with about 80 gallons by previous units that hauled payloads of approximately 10 tons.

"Average speed is 35 to 40 mph. A round trip, including loading and unloading, averages 18 hours, against 20 to 22 hours with the previous units.

"These new trucks were purchased June 15, 1944. Each has run approximately 35,000 miles. Maintenance averages $30 per unit, excluding oil and grease. We are so well satisfied that we have given our proposal to purchase 10 more."

International K-7's (KS-7's with two-speed axle.) are powered by the famous International Blue Diamond Engine. They are outstanding examples of the efficiency of ample truck capacity and power—power to pull and climb smoothly at low cost; and they are examples also of the dependable International Truck performance that explains why more Heavy-Duty Internationals were sold before the war than any other make.

**INTERNATIONAL HARVESTER COMPANY**
180 North Michigan Ave. Chicago 1, Illinois

INTERNATIONAL HARVESTER

**Owner: Guden Bros., Inc.**
**Linworth, Ohio**

Three International Models K-7:
134-Inch Wheelbase
Engines: International Blue Diamond
Axle Ratios: 7.16 to 1 - Single Speed
Transmissions: Direct
Payloads: 13 tons, average
Fuel Consumption: 5.7 Miles per Gallon

**New Trucks:** The government has authorized the manufacture of a limited quantity of trucks for essential civilian hauling. International is building them in medium-duty and heavy-duty sizes. See your International Dealer or Branch for valuable help in making out your application.

# INTERNATIONAL *Trucks*

ABOUT a half-dozen body tools, like these, are the only "special equipment" required.

# BODY MAINTENANCE IS

## (AND YOU'LL KNOW HOW TO SERVICE AT LEAST

**HERE's the first of a series of factory-sponsored articles on truck body maintenance. . . . This one gives you step-by-step repair and replacement operations on International Harvester's popular "Metro" bodies.—Editor.**

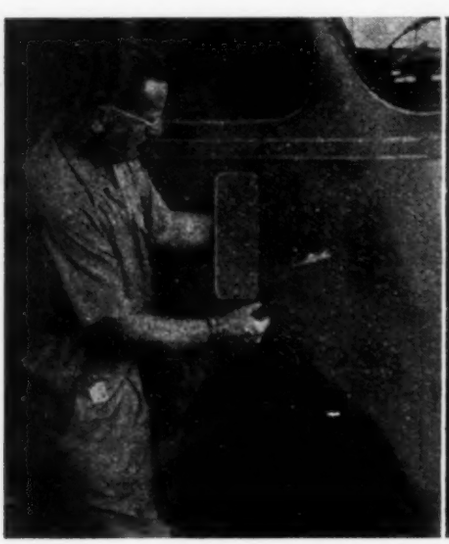
FLEET men who participated in our recent survey on Truck Body Hardware, seem to have indicated that they are paying greatly increased attention to truck body repairs, principally as a wartime conservation measure — because old trucks have to last much longer than they formerly did, since new ones have not been easily available.

A great deal of interest centers around the repair of the so-called "unconventional" types of bodies. In some quarters it has even been whispered that some of these bodies are more difficult to repair than so-called "standard" bodies, such as conventional panels, vans, etc. But there is hardly such a thing as "standard" construction any more.

In order to help fleet operators out of any such difficulties—imaginary or otherwise—and to help correct the perhaps mistaken belief that one type of body might be more difficult to repair than another type, the author has secured a rather complete servicing set-up covering the "over-all" type of body found on light trucks manufactured by International - Harvester Company—better known as the "Double-Capacity" or "Metro" type of body.

As most fleet operators are well aware, the evolution of this type of body (and there were some 12 or more different makes available in 1941) came about through the desire to double the payload space on a short-wheelbase, light chassis. The bodies were made "man-high" so as to enable the driver or routeman, to load—and work the load—in less time, as well as to carry more of light bulky payloads than could be handled in standard panel bodies of the so-called "conventional" type. In addition to building the body completely around the truck chassis, eliminating the hood, cowl and running-boards, the job involved moving the driving controls forward, and little else, generally speaking.

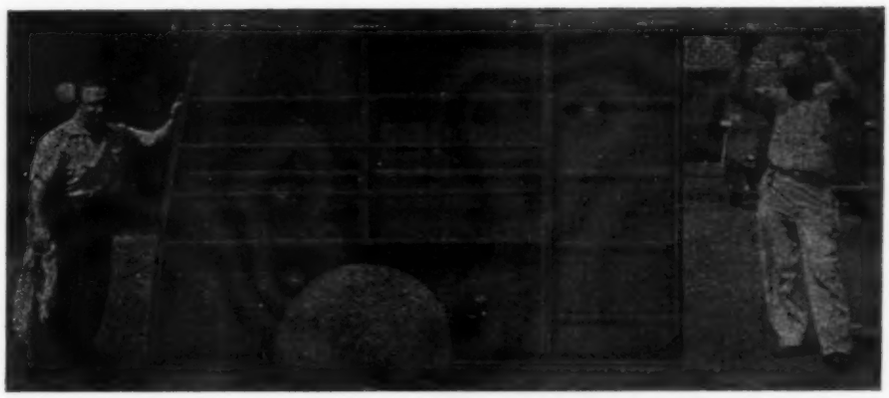
From the maintenance standpoint, the distinguishing difference is found in the compactness and unit construction of the body, and the fact that it is completely lined with readily-removable lining. Some users have not been completely aware of this latter fact. On the outside, of course, the panels are welded to the structural members and then bolted and welded to each other, making virtually a one-piece unit. But on the inside, all lining sections are attached by metal screws, which can be removed and replaced at will, should



YOU know, of course, how to ding out dents. . . . In this case the ventilator provides access for holding the dolly block.

TWO stout sticks and a wire, used in this fashion, help press radiator grille panel assembly in place after repairing.

SIDE panel linings are easily detached by removing screws which hold them in place. In the next picture you'll see just how.



SIDE panels, complete with framing, come as a replacement unit, should they be needed.

# EASY if YOU KNOW HOW

## ONE BODY JOB IF YOU BUT HEED THIS ADVICE)

*By P. R. Kerr*

it be necessary to remove dents or to replace broken or torn exterior panels, or to straighten bent framing. The object of this article, therefore, is to give you some "how-to-do-it" information on the subject.

First no special tools are needed, other than those you would ordinarily use in general body repair work. A typical assortment of such tools is shown in the photo above. The makers point out that all repair operations are quite simple, since means of access have been provided to get at the various body sections, and that speed of repair is possible if the correct procedure is followed. Many fleet users, they state, have reported extreme ease of repair when they did the job in the proper manner—which is what we are going to give you here.

The Metro Body is built on the sub-assembly principle and consists of the following principal sub-assemblies or components:

(1) An all-steel welded platform with removable one-piece center floor section.

(2) Right and left-hand side panel assemblies in which the reinforcing posts and ribs are welded as an integral part.

(3) Front unit assembly, which includes both front quarter panels, right and left window panels (on side), windshield lower belt panel, inside lower panel, front and front side panels, inside.

(4) Rear unit assembly, including rear quarter panels, rear door posts, and license-plate lower rear panel.

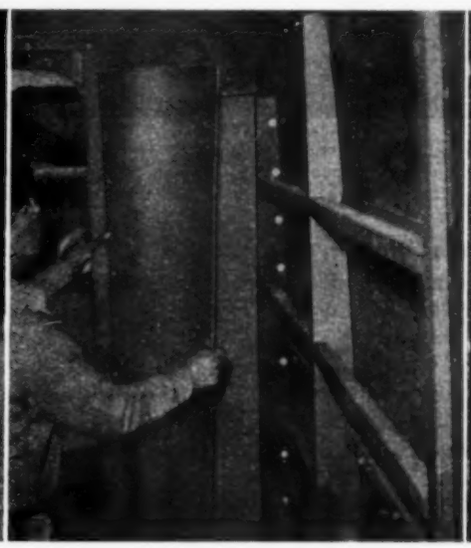
(5) Complete roof assembly (front, center and rear sections), including reinforcing bows, corner trim panels and removable lining sections or panels attached with metal screws.

(6) Such accessory parts as radiator grille panel, side and rear doors, windshield center-post (inside and out).

The side panel wall space between the outer paneling and the lining is approximately 3 inches wide. In the roof, this space is one inch and is filled with glass wool insulation. The locations of the cross-members in the floor, the side-posts and longitudinal wall members, as well as the cross-bows in the roof, can be determined by removing the floor and lining panels, or by gently "sounding" for them by tapping with a light hammer. The radiator grille section is *not* welded to the frame, but is held in place by metal screws.

(*Please turn to page* 74)

IN removing side panel lining, care must be taken in handling, so as not to bend it. . . . Two men are better than one here.



REAR corner lining is easily removed, like this, by taking out screws. . . . Note that side lining has also been taken out.

DENTS in front quarter can also be taken out by removing headlight assembly and working the dolly block from the inside.

facilitating easy, speedy removal when necessary.

Before the need for any repair work to this particular type of body occurs, it would be well to have your body man make a pattern or template of plywood, in the exact size and shape of the windshield opening; also one for the front window opening; or these can be obtained from the manufacturer. Then if there should be serious damage to the front top area of the body, you would have a definite pattern to follow in re-shaping the windshield opening or the front window opening.

Another bit of pre-repair advice: Experience shows a tendency on the part of many body men to use an acetylene torch for gaining access or for softening metal to hasten working it back into proper positions. The excessive use of the torch is not desirable, as heat stretches metal and makes it difficult to restore it to its original shape or alignment.

Experience shows that less than one-half of one percent of these bodies have required replacement of important panels, but if collision damage is so great as to make it uneconomical to recondition a panel or other part of these bodies, replacement units are available, such as complete side panels, or a post, rib, cross-member, grille, roof panel or sub-assembly, front section, rear quarters, platform, etc. Some operators have not been aware that such replacements are obtainable.

In the following paragraphs are given the necessary instructions for repairing or replacing, as the case may be, many of the units mentioned above.

THE use of a piece of strong twine provides a slick way to install new window glasses. The text of this article tells you just how to do it.

SHOULD the replacement of any unit be necessary, all of the welded seams are easily located, easily broken, and easily welded together again.

SPOT welds are used to secure outer panels at all seams thruout body. When repair is completed, they are ground flush and filled with solder.

RADIATOR GRILLE REPAIRS:—Experience has proved that if the front grille is badly damaged, it costs less to buy a new grille section or even the entire grille panel, than to take the necessary time to repair and re-shape the old one. Either the grille alone or the grille and grille panel are available as replacements and even single bars for the grille are available. If repair is indicated, this can be done by first removing the bumper and then the screws holding the grille panel in place, after which the panel can be lifted out and straightened or repaired.

If a new grille panel is needed, the old panel can be removed by taking out the screws at sides and bottom and the new one put in place, clamping it lightly at the bottom. Then a wire is inserted through the grille (near the top) on one side of the center post and out again on the other side. Twist the ends together, forming a loop. Insert a stick through the loop, bracing one end at the bottom of windshield, and draw up the other end to make the grille panel fit snugly against and under moulding at the top of the opening. Use a second stick as a prop to increase the tension and to hold the grille panel firmly against the top of the opening. (This method is illustrated in one of the photographs accompanying this article.) Next tighten clamps at bottom and insert screws; tighten screws and remove sticks, clamp and wire loop. If the screw holes in the new panel do not exactly match the holes in the underlying strip, insert drill in new panel holes and drill the underneath strip to conformity.

REPLACING WINDSHIELD AND FRONT QUARTER GLASS:—When any of these glasses break, they can be easily replaced by first clearing the opening of all dirt, sealing compound, etc. Next put the new rubber channel around the edge of the new glass and insert a length of strong twine (suggest carpenter's chalk line) in the groove that is cut in the outer edge of the rubber channel, forcing the twine into the groove with a dull tool until the ends of twine cross, leaving the ends hanging out. Next place glass in position in window opening from inside of body, and press rubber channel into snug position in the window opening, with ends of twine hanging outside. Apply sealing compound to flange of opening between rubber channel and flange. Take bottom end of twine and pull out slowly, to raise rubber channel over metal flange of window opening. Next apply more sealing compound between rubber channel and body and between rubber channel and glass. Do not push or pound on glass, but rub in gently by hand until the sealing compound sets. This operation is also illustrated.

REPAIRING FRONT QUARTER PANEL:—Most of the common repairs to this section will entail the removal of dents. If the dent is to the front, between the

(*Please turn to page* 124)

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FIG. 1—Here's a typical case of low temperature sludge on screen of engine oil pan.

# LOW TEMPERATURE SLUDGE

## (HOW IT FORMS, WHAT IT'S COMPOSED OF and SOME

WINTER is the time to talk about low-temperature sludge. . . . In this article an oil expert gives you an unbiased discussion, complete to the last detail, including some specific maintenance recommendations to prevent its formation in truck and bus engines.—Editor.

UNDER slow speed, or frequent start-and-stop or short trip operating conditions of passenger cars and in certain types of bus and truck service, a type of sludge is formed which has been appropriately referred to as *low temperature sludge or cold engine oil sludge.*

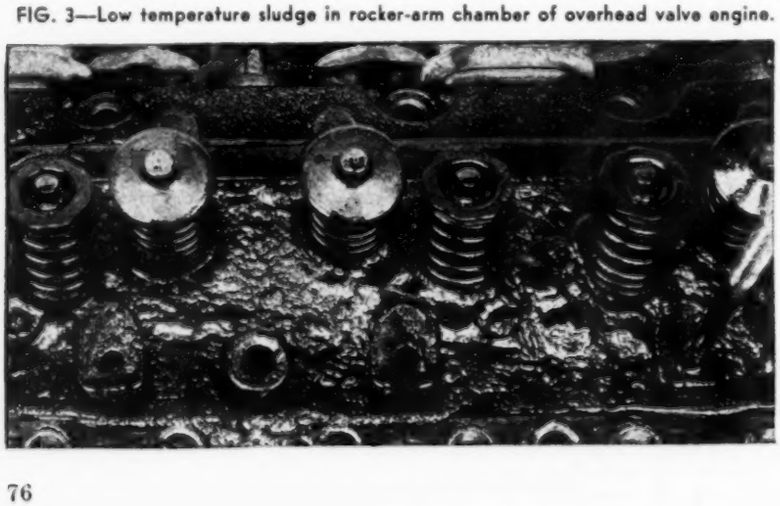
Invariably this sludge formation is blamed on the engine lubricating oil. It is the purpose of this article to present information on low temperature sludge in gasoline engines, its manner of formation, its composition and the recommended practices to overcome it. A suggested method for cleaning sludged engines also is included.

NATURE AND METHOD OF FORMATION: Low temperature sludge may be described as a black, brown or grey-colored deposit having a soft mayonnaise-like consistency. *It is formed in engines as a result of operation at low engine temperatures such as exist during starting, warm-up and also during intermittent start-and-stop and low-speed driving.*

An engine is said to be operating at a low temperature or as a "cold" engine when cooling water temperatures and crankcase oil temperatures are below 140°F. Low operating temperatures also are considered to exist when crankcase oil temperatures are below 140°F. with cooling water temperatures above 140°F. This latter condition may occur during winter operation where cold air continually passes over the crankpan, causing rapid heat dissipation, while the cooling system thermostat maintains normal jacket temperatures.

Under these conditions of "cold" engine operation, moisture from the condensation of water vapor reaches the crankcase oil where it emulsifies with the other contaminants usually present in used engine oil, such as fuel soot, lead salts, oil and fuel oxidation products, metal particles and dirt, to form a "gooey", pasty mass commonly termed low temperature sludge.

FIG. 3—Low temperature sludge in rocker-arm chamber of overhead valve engine.



An increased rate of blow-by accompanies "cold" engine operation, due to the greater piston and ring clearances that exist, with the result that more contamination of the crankcase oil with fuel combustion products occurs. The source of the constituents of oil-free low temperature sludge are as follows:

*Water:* During the combustion of the air/fuel mixture in a gasoline engine, the oxygen in the air combines with the hydrogen in the hydrocarbon structure of the gasoline to form water ($H_2O$) which is present in the combustion chamber as a vapor.

Approximately one gallon of water is formed from each gallon of gasoline that is burned to completion. Under normal operating conditions, the major portion of this water vapor passes harmlessly out the exhaust. However, under conditions of "cold" engine operation, much of it condenses on the relatively cold cylinder walls; the water thus formed being scraped into the crankcase by the action of the piston rings.

Some of this water vapor also

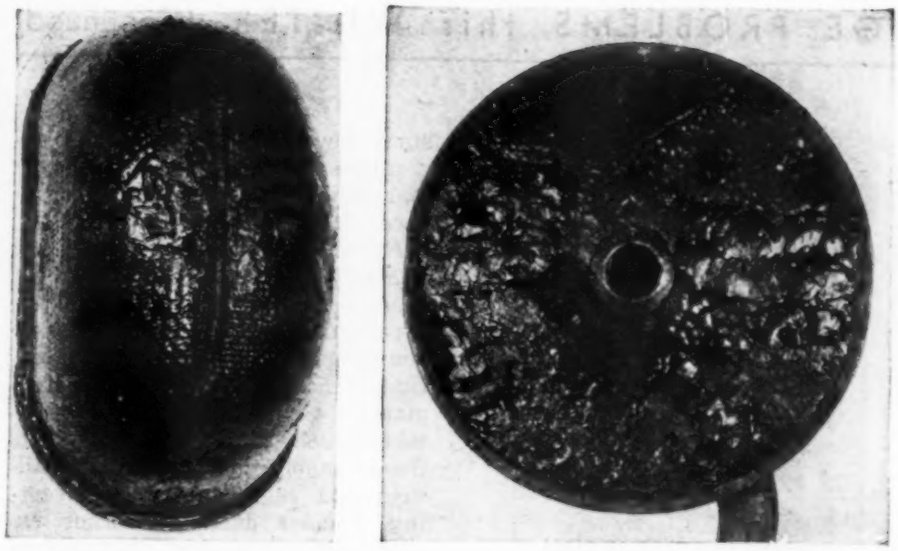


FIG. 2—Two types of automotive oil-pump screens, showing low temperature sludge.

# AND WHAT to DO ABOUT IT

## RECOMMENDED PRACTICES to HELP YOU OVERCOME IT)

By E. J. Bowhay,

*Technical & Research Division,*
*The Texas Company*

reaches the crankcase directly as a result of piston blow-by, where it condenses on the relatively cold sides of the crankcase and crankpan. In addition, under certain conditions, moisture in the air entering the crankcase through the breather may also condense on these relatively cold surfaces. One source of water which has nothing to do with "cold" engine operation but which occurs more often than is realized, is cooling system leakage. With present-day gasket materials, this possibility is decidedly prevalent.

*Fuel Diluent:* Over-choking and the incomplete combustion that results with cold-running engines permits quantities of unburned and partially burned gasoline to dilute and contaminate the crankcase oil.

*Fuel Soot:* This material, which is like lamp-black, is formed in the combustion chamber in rather large quantities under the rich mixture conditions which exist during starting and warm-up. It is also caused by incomplete combustion which accompanies "cold" engine operation. Fuel soot reaches the crankcase by mixing with the oil that is being returned by the piston rings. Some fuel soot also finds its way directly into the crankcase with the blow-by gases.

*Lead Compounds:* During the combustion of leaded gasoline, lead compounds are formed. These compounds are carried into the crankcase by mixing with the oil that returns from the pistons. They are also carried down by blow-by gases. Aside from the fact that these compounds are present as a constituent of low temperature sludge, they are not harmful.

*Oxidized Material:* Due to the comparatively low oil temperatures which exist during "cold" engine operation, very little oil oxidation takes place. However, oxidized material is usually found in the analysis of low temperature sludge deposits. This material may be due to oil oxidation which occurred during the periods of normal or severe service preceding or following the sludge-forming period. It might also result from slow oxidation of oil entrapped by the sludge.

*Metals:* Besides the presence of lead compounds resulting from leaded fuel combustion, already discussed, iron is also found in varying amounts. Its origin is the normal wear of such engine parts as rings, pistons and cylinder walls. Under these low engine operating temperatures the amount of iron is increased by the accelerated wear of these parts caused by rusting, due to condensed water vapor, and by the corrosive action of certain acids formed when combustion gases combine with condensed water vapor.

Where aluminum pistons, copper-lead bearings, etc. are used, small amounts of these metals will also be found in the oil.

*Dust and Dirt:* Entry of these contaminants with the carburetor intake air or through the crankcase ventilating system constitutes the source of the silica usually found in this type of sludge.

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FIG. 4—Some low temperature sludge may be found on the crankshaft throws.

In general, the sludge formed by the emulsification of the oil and water, assisted by the other contaminants which act as emulsifying agents, is not restricted to any one type of oil nor is it dependent on the quality of the oil.

There has been some recent indication that heavy-duty detergent type oils are more effective in preventing the formation of this sludge than regular or ordinary types of motor oils. The field data still are rather confusing, as the extent of testing has not been sufficient nor the results conclusive enough to warrant making any definite statement in this regard at the present time.

*Sludge Composition:* The results of analyses of several low temperature sludge deposits found in the crankcases of automotive engines operating under present-day conditions have been averaged and are as follows:

*Oil as Received:* Oil 83.1 percent, water 6.2 percent, gasoline diluent 4.7 percent, free carbon (fuel soot) 1.6 percent, oxidized material 0.8 percent, free mineral matter 3.6 percent. The chief components of the free mineral matter are lead and iron, the minor components being aluminum, copper and silica.

*Oil-Free:* Water 36.7 percent, gasoline diluent 27.8 percent, free carbon (fuel soot) 9.5 percent, oxidized material 4.7 percent, free mineral matter 21.3 percent. The chief components of the free mineral matter are lead and iron, the minor components being aluminum, copper and silica.

The source of the water and diluent has already been discussed. Free carbon found in this type of sludge is attributed almost entirely to fuel soot from the combustion chamber, since negligible oil oxidation takes place to cause any carbon formation from that source. In addition to the source of the oxidized material already discussed, heavy ends of fuel may also constitute a portion of this material.

Free mineral matter is the insoluble material remaining after the oil, water, diluent, free carbon and oxidized material have been removed. It is composed of lead salts from leaded fuel combustion, metallic particles from engine parts and dust and dirt from external sources.

*Effect of Wartime Gasolines:* In order to increase the quantity and quality of gasoline being produced for military needs, both automotive and aviation, the Petroleum Administration for War has imposed certain limitations on the quantity, distribution and characteristics of gasoline produced for civilian use.

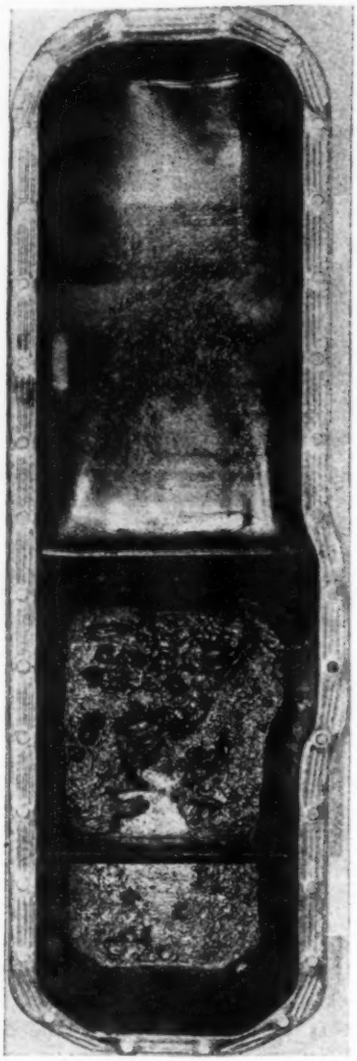


FIG. 5—Showing low temperature sludge accumulation in automotive engine oil pan.

There have been some recent indications that, under engine operating conditions promoting low temperature sludge (chiefly low cooling system temperatures and low crankcase oil temperatures) there is a tendency for certain wartime gasolines to be more prone to influence the formation of this sludge than pre-war gasolines. Brief but inconclusive investigations conducted so far tend to indicate that the chemical composition and volatility of these gasolines may be factors.

Further studies in this connection are now in progress. These findings are important, however, since they show that it is more imperative than ever to maintain normal engine temperatures in accordance with accepted practices.

*Effect of Low Temperature Sludge on Engine Performance:* Besides giving an unsightly, dirty appearance to the engine interior, low temperature sludge can be decidedly harmful to engine performance. Clogging of oil pump intake screens and oil lines restricts the oil supply, causing bearing failures and severe crankshaft scoring, besides damaging other engine parts dependent on pressure feed for lubrication.

Oil filters are quickly clogged, rendering them inoperative for further sludge removal. Ring sticking and valve sticking also occur when this sludge is circulated with the oil. Oil ring clogging has also been experienced, resulting in high oil consumption which, in turn, may also cause ring sticking and combustion chamber deposits.

In the winter, freezing of the water in the sludge has been known to break oil pumps. In addition to the cost of parts replacement and overhaul time, the operator is also confronted with the difficulty of completely removing this sludge from the engine. Typical examples of low temperature sludge formation are shown in the accompanying illustrations.

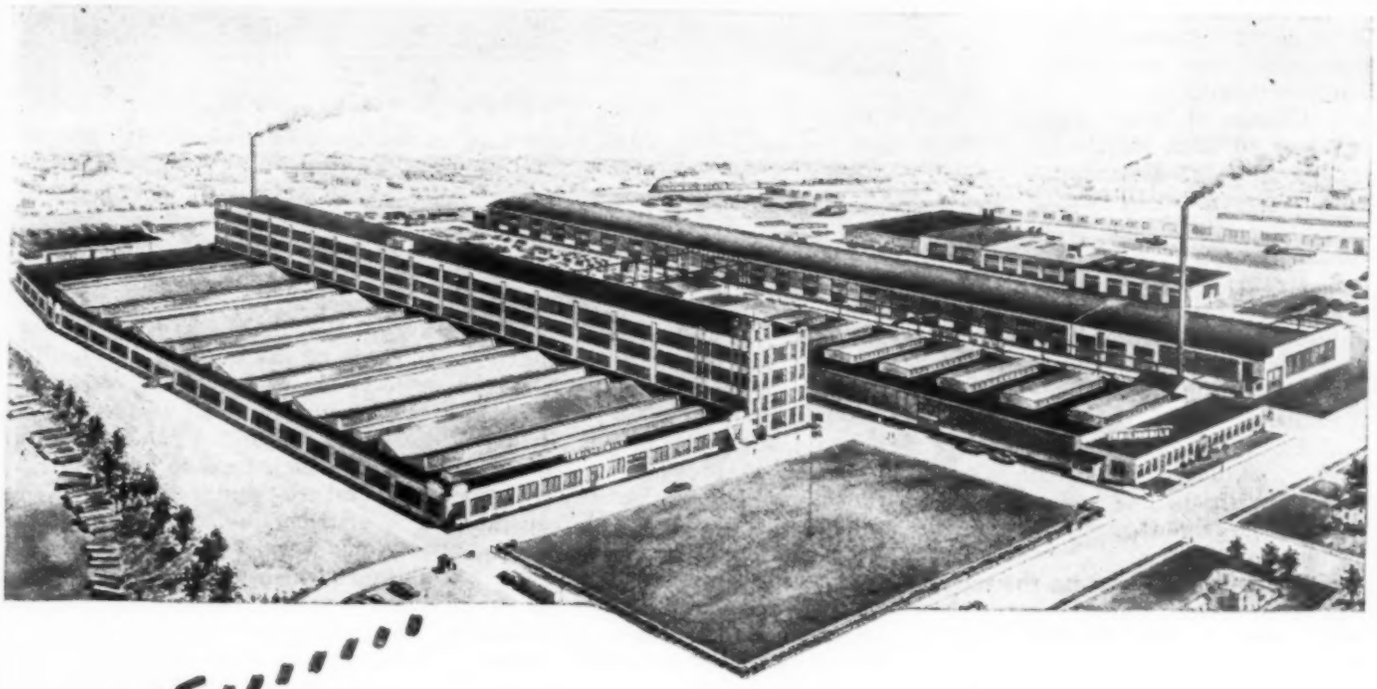
PASSENGER-CAR ENGINES: The effects of wartime driving are many. Gasoline rationing and the limitation of maximum speed to 35 m.p.h. has brought about driving conditions which are conducive to the formation of low temperature sludge, as previously described. Short runs with insufficient time for the engine to warm up, and intermittent start-and-stop and slow speed driving are conditions which promote the condensation of water vapor and unburned fuel vapors in the crankcase oil.

The absence of occasional high-speed driving and long trips does not permit the crankcase oil to warm up sufficiently to evaporate these volatile contaminants as in pre-war days.

Crankcase ventilation, which aids in the removal of these volatile contaminants, depends largely on the velocity of the air flowing past the ventilator outlet pipe and at the low road speeds existing today, insufficient ventilation results.

(*Please turn to page* 80)

# THIS is what's behind every Trailmobile on the road!



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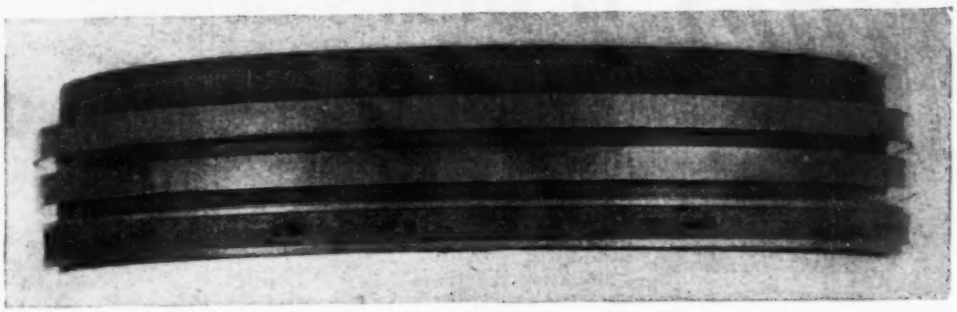

FIG. 6—Note the rings on this piston, operated on ordinary, untreated motor oil. This is shown here for comparative purposes, with the lower illustration on this page, to show the difference.

*Recommendations to Prevent Formation:* Field experience has shown that adherence to the following recommendations will do much to prevent this type of sludge in passenger car engines during present-day wartime driving.

1. Change oil every 1000 miles or 60 days, whichever occurs first, in accordance with accepted oil-change recommendations for wartime driving.

2. Drain crankcase immediately after road operation, while oil is *hot,* and before any settling occurs. Flushing the engine with a suitable flushing oil will assist in keeping it clean.

3. Use the lightest grade of high quality motor oil consistent with engine conditions and in accordance with engine manufacturer's recommendations.

4. Check cooling system thermostat for proper functioning and make sure it will provide rapid warm-up of the engine. If thermostat opens at too low a temperature, a higher temperature thermostat should be installed. Depending on the make of the engine, the type of thermostat, and also the nature of the anti-freeze, the cooling system temperature should range somewhere between 160 and 180° F.—the higher the better.

5. Check crankcase breather to insure freedom from restrictions and clean and re-oil the breather cap air cleaner at recommended intervals. Adequate crankcase ventilation aids in preventing condensation of water and fuel vapors in the crankcase and valve chamber.

6. Clean and re-oil the carburetor intake air cleaner at recommended intervals. More frequent cleaning is required where much dust is encountered.

7. Replace oil filter cartridge at the mileage recommended by the manufacturer or more frequently, if rapid clogging occurs.

8. Use a manually controlled choke sparingly during cold weather operation, to prevent unnecessary crankcase oil contamination. Where an automatic choke is used, consult with car dealer to insure that choke is operating properly.

9. Cover radiator front to increase the rate of engine warm-up. In sub-zero temperatures, covers are absolutely necessary to get adequate warm-up. Care must be exercised to prevent overheating following the warm-up period.

10. Use proper heat-range spark plugs and have them cleaned and adjusted at regular intervals.

11. Check ignition system regularly, including timing and distributor points.

12. In extreme cases, installation of smaller sized jets in carburetor, in accordance with manufacturer's recommendations, may be necessary to correct poor combustion conditions due to rich mixtures.

13. Where loss in power is observed, check compression pressure and make necessary mechanical repairs, including valve grinding and installation of new rings.

BUS AND TRUCK ENGINES: Types of service and operating conditions vary. Usually bus and truck operation is of the heavy-duty type involving heavy loads with resultant high engine and oil temperatures. However, there are some types of service which tend to promote low temperature sludge in these engines. Door-to-door delivery and city bus services are examples of those in which this sludge can form quite easily, particularly during cold weather operation, unless proper precautions are taken.

Under these service conditions, frequent stops and starts do not permit the engine and the oil to warm up sufficiently to prevent condensation of water vapor or to evaporate volatile contaminants in the oil. Crankcase ventilation, which aids in the prevention and removal of these contaminants is, in some installations, dependent on vehicle speeds to a large degree and, therefore, is not too effective when comparatively low road speeds exist. In addition, considerable crankcase oil dilution results from extended idling during cold weather.

Operators of large fleets oftentimes have to store vehicles outdoors due to insufficient indoor storage facilities. During winter months, such outdoor storage invariably requires certain winterization practices to permit easy starting as well as to prevent freezing of the cooling system water, since certain fleet operators in certain localities do not use anti-freeze.

Some of these winterization practices call for idling of engines for short periods at scheduled intervals. Invariably, however, periods of extended idling inevitably

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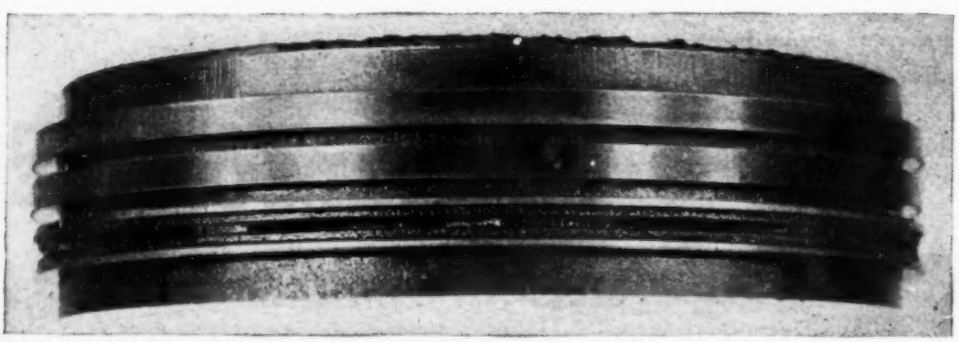

FIG. 7—Note the rings on this piston, operated on heavy-duty, detergent oil. A comparison of the two indicates that the heavy-duty, detergent oil definitely prevents plugging of the oil rings.

# TO MAKE TRUCKS LAST, PUT QUALITY FIRST . .

## YOUR JOB IS TO KEEP THEM ON THE ROAD

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develop and under these conditions, poor combustion at low engine temperatures, coupled with insufficient crankcase ventilation, causes low temperature sludge formations in crankcases and valve chambers.

*Experience of Automotive Field:* During a recent gathering of commercial fleet operators, and representatives of engine manufacturers, oil filter manufacturers and the oil industry, to discuss the problem of low temperature sludge, the following observations were reported by *fleet operators* themselves:

1. Proper crankcase ventilation is very important.

2. Oil filters aid slightly but should be used in conjunction with other factors.

3. Vehicles operating near bodies of water are more prone to form sludge than those operating away from water.

4. Mixing of different brands of oils may increase sludging tendency.

5. Radiator covers are effective for quick warm-up but cause overheating difficulties when wide atmospheric temperature changes occur.

6. Manually operated shutters are favored over automatic shutters by some operators but their use depends on the diligence of drivers.

7. High opening temperature thermostats are desirable.

8. Heavy-duty detergent type oils may tend to reduce sludge, but are not the whole answer and should be used in conjunction with other factors.

9. Changing pitch of fan blades, removing fans entirely and employment of heating coils around crankpan have been tried with varying degrees of success.

10. One operator with 27,000 vehicles operating under various conditions experienced less than 0.1% engine failures per year from sludge troubles.

11. Engine design, exclusive of crankcase ventilation, is an important factor in the tendency to form sludge. Different designs operating side by side in Canada varied considerably in sludge forming tendency.

12. Present-day oils and engines are less troublesome than those of several years ago.

13. Frequency of oil drains is also very important. More frequent changes should be made during cold weather.

14. Broken valve springs experienced with sludged engines are due to corrosion of metal by water in sludge.

Engine manufacturers pointed out that the best method to prevent low temperature sludge is by keeping engine temperatures up. In addition to the use of as high an opening temperature thermostat as possible, other methods to accomplish this as well as to prevent moisture condensation are as follows:

1. Installation of a pan beneath the engine to keep cold air away from the crankcase during road operation.

2. Use of a radiator cover consisting of a manually controlled curtain or an automatically controlled shutter.

3. Insulation of the crankpan with an insulating compound to prevent the rapid radiation of heat that occurs with a stamped steel pan.

4. Similar insulation of breather pipes and rocker arm cover to prevent condensation of water vapor.

5. Insulation of oil filter to prevent heat dissipation and where long oil lines are used they should also be insulated.

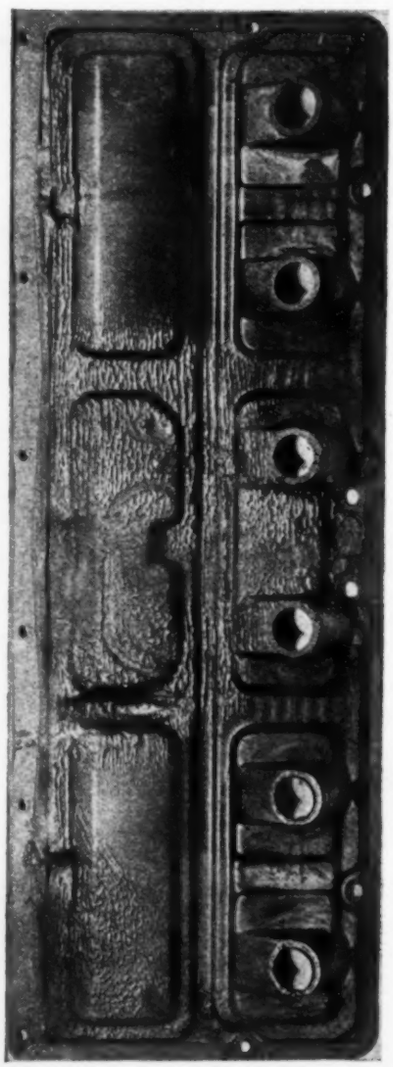

FIG. 8—Showing low temperature sludge accumulation on auto engine side cover plate.

*Effect of Heavy-Duty Detergent Type Oils:* There has been considerable conjecture on the part played by heavy-duty detergent type engine oils in the prevention of low temperature sludge. However, as previously stated, the amount of information available still is insufficient to warrant making any definite statement in this regard at the present time.

In connection with oil ring plugging in gasoline engines, which has been noted where low temperature sludge-forming conditions exist, laboratory tests under simulated low temperature operation in Chevrolet engines have shown that a heavy-duty detergent type oil prevents oil ring plugging, as compared to the clogged condition obtained with a regular straight mineral type motor oil. This comparison is shown in the pictures on page 80.

In a recent SAE paper on *"Cold Engine Sludge and Its Control"* by B. E. Sibley, the results of an extensive but impartial survey of the effect of heavy-duty detergent type oils on oil ring plugging in actual service are discussed. A total of 37 fleets involving some 37,000 vehicles contributed data. These fleets included public utility, municipal delivery, fuel and oil delivery, bus and taxi.

This survey showed that under conditions of operation where there is a tendency for regular motor oil to cause oil ring plugging, the use of a heavy-duty oil nearly always either materially reduces or eliminates the trouble.

It is also interesting to note that the recent CRC Cold Engine Oil Sludge Group, comprised of representatives of fleet operators, engine manufacturers, oil filter manufacturers and oil refiners, issued the following statement with regard to low temperature sludge formation in Army vehicles: "It is the consensus of this committee that the type of oil being used by the Army is the best available at the present time for engine lubrication in

(*Please turn to page* 118)

*By Government authorization, heavy-duty Autocar Trucks are now in production in limited quantities for essential commercial hauling. Act at once. Your Autocar Branch will help you file your application. . . . Follow the leaders, for they know the way.*

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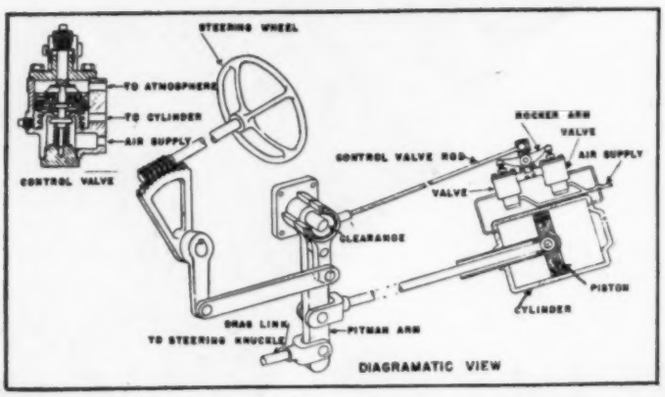


FIG. 1—The Bendix-Westinghouse air-operated steering booster.

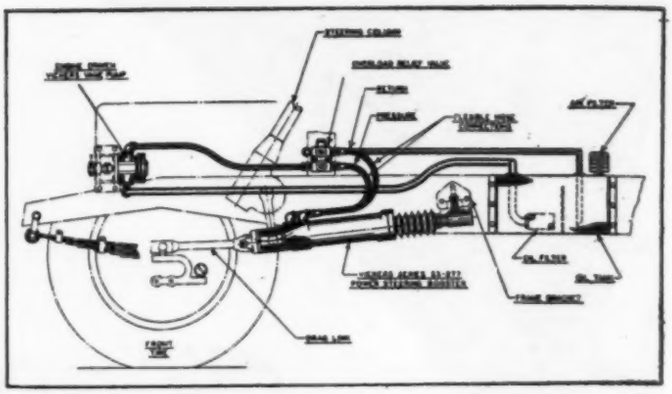

FIG. 2—A typical application of the Vickers steering booster.

# POWER STEERING FOR TRUCKS?

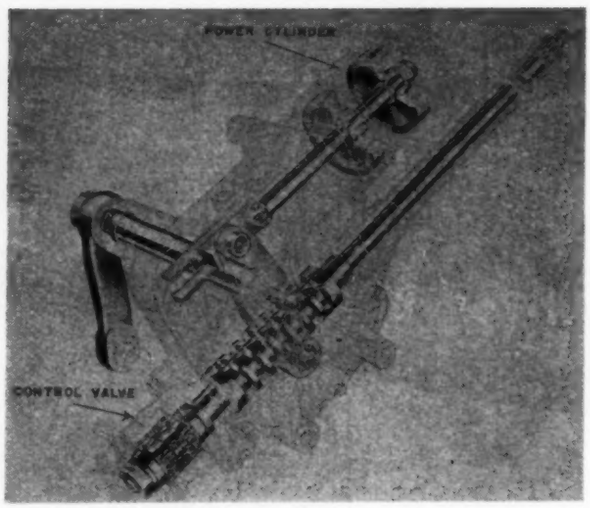


FIG. 3—The Ross-Bendix integral hydraulic steering gear.

**EXCERPTS FROM a PAPER READ BEFORE SAE's ANNUAL MEETING, by F. W. DAVIS, CONSULTING ENGINEER, WALTHAM, Mass.**

THE GREAT variety and increasing number of heavy-duty vehicles which have been put into operation in recent years, many of them with front axle loadings that make manual steering impractical, has intensified interest in power steering gears. Fortunately, the need for such gears was sufficiently anticipated, so that when military and other critical demands for servo steering mechanisms arose, there were commercial units available.

Many years ago, a great number of driving chores (such as cranking the engine, wiggling a windshield-wiper, squeezing bulb-horns, etc.) were taken out of manual operation, and with the advent of the modern heavy-duty vehicle, we are now quite accustomed to power assistance for brakes, clutch and transmission operation, and many other functions. While power assistance in steering has been slower in obtaining commercial acceptance, its possibilities in evading the limitations of manual steering have been realized for many years.

The patent art on power-assisted steering gears for automotive vehicles goes back to 1906. Perhaps the first automobile power steering gear to attract attention in this country was a mechanical torque amplifier developed by the Bethlehem Steel Company. Another early gear was the author's first hydraulic unit, demonstrated in 1928. A number of vacuum and compressed-air operated steering boosters—one with electrical operation of control-valves appeared in Europe in the early 1930's.

Power steering gears currently available in the United States may be classified as follows: *Vacuum:* Empire. *Compressed-Air:* Bendix-Westinghouse. *Hydraulic:* Vickers, Hub, Ross-Bendix, Saginaw-Bendix. With the exception of the Ross-Bendix and Saginaw-Bendix, these steering gears are boosters, which can be mounted on existing vehicles with minor or no modification of their manual steering gears.

Fig. 1 illustrates the Bendix-Westinghouse mechanism. The two control valves are mounted on the cylinder, and they are operated in a manner which, broadly, is common to most of the gears. Between the linkage operating the valves and that leading to the front wheels, is a slight amount of play. The taking up of this play actuates a valve which applies pressure to the appropriate end of the power cylinder, thus causing the piston to follow up the movement of the steering wheel. When the driver stops turning the wheel, the piston restores the play in the linkage, bringing the valve back to neutral.

In the case of the Bendix-Westinghouse gear, the valve first cuts its end of the cylinder off from the atmosphere, then admits air under pressure. Whatever pressure exists in the cylinder also reacts against the valve and, through the control linkage, against the driver's hands.

The Vickers hydraulic gear, Fig. 2, also utilizes a small amount of play between the Pitman arm and the drag-link to operate the valve, but because the valve is integral with the power cylinder, the linkage is quite simple. Fig. 2 illustrates a typical application. There is no oil reaction against the valve, and up to the maximum output of the power cylinder, substantially the only effort required of the driver is to

(*Please turn to page* 86)

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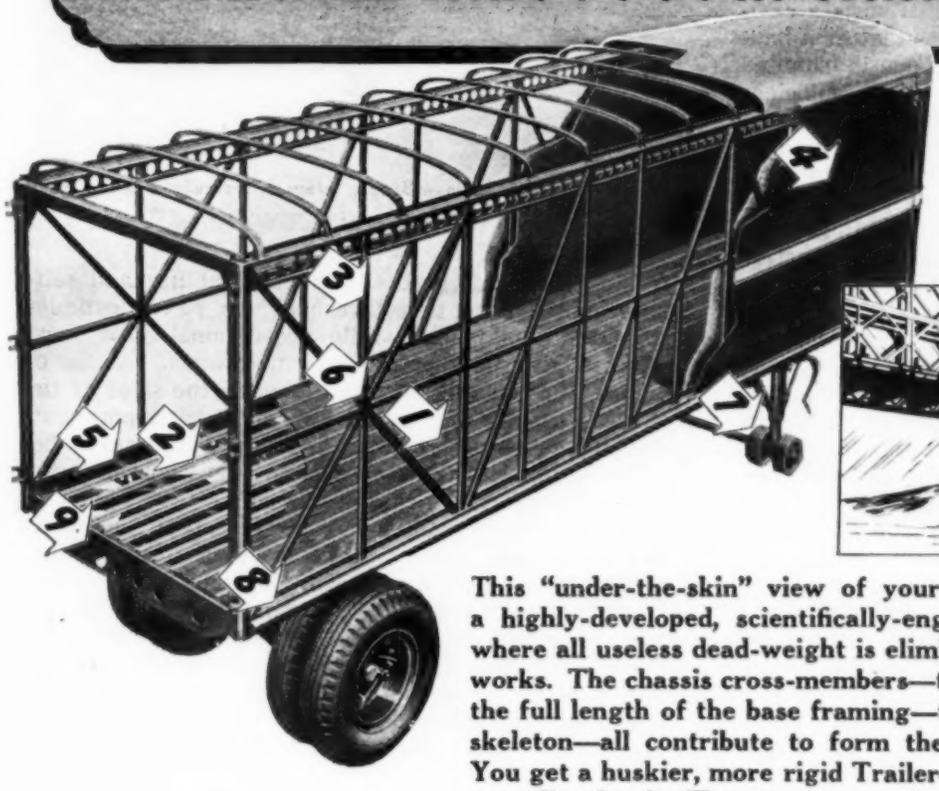
## EVERY POUND OF STEEL CONTRIBUTES TO SUPPORT AND PROTECT THE LOAD! . . . . *No Useless Dead-Weight!*




An artist's copy of the type of bridge construction used by the Army engineers to carry heavy equipment. Compare the almost identical framing of a Fruehauf Integral-Frame Aerovan with this efficient weight-carrying structure.

**This "under-the-skin" view of your 1945 Fruehauf Trailer reveals a highly-developed, scientifically-engineered product—a unit-design where all useless dead-weight is eliminated and every pound of metal works. The chassis cross-members—the steel ribs running practically the full length of the base framing—the patented steel-tubular upper skeleton—all contribute to form the sturdy, rugged unit-structure. You get a huskier, more rigid Trailer—without excess weight—hence your Fruehauf will carry more payload longer and at lower cost.**

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5. **Frame Cross-Members**—Die-formed of high-tensile steel. Stress factors are scientifically computed and all non-load carrying metal is punched out in accordance with the aircraft principle.
6. **Complete Welded Unit**—Forms entire integral-frame Aerovan into a solid, durable, one-piece unit.
7. **Wide Vertical Supports**—Eliminate nose-diving. Mounted under outer sides of frame—provide maximum strength and stability. 2-Speed gear ratio.
8. **Spring Hangers**—mounted vertically, directly under the load-carrying frame members—a great improvement over the old "offset" method. The result—twisting stresses eliminated, road stability gained.
9. **Extra Strength**—At points of greatest stress, extra support is provided by additional, wider, deeper cross members. At Upper 5th Wheel maximum rigidity is secured by steel channel box-sections.

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overcome friction in the steering gear and the resistance of a light centering spring. Power is furnished by a vane pump producing up to 1000 lb. per sq. in.

The Ross-Bendix Gear, Fig. 3, and the Saginaw-Bendix Gear, Fig. 4, are basically alike in their manner of operation except that the former uses a cam-and-lever type of reduction gear and the latter a ball-nut form. In both cases the control valve is mounted at the end of the steering column. When sufficient resistance to steering is encountered, the steering post moves endwise a slight amount, this motion being used to actuate the valve. The power cylinder is integral with the steering gear housing and the piston transmits power to the cross-shaft through a sliding block.

The B-W booster gives a proportional reaction through the working range. When the steering force required exceeds the output of the power cylinder, the driver supplies the extra amount, and a curve would show the same slope as for manual operation. Due to friction in the steering gear and connections, the B-W booster does not transmit light reactions from the road to the driver, and to that extent the feel of the road is absent. This gear is partially self-righting, but not freely so, and somewhat lacking in directional stability. The booster absorbs road shocks, merely allowing a slight and not objectionable reaction to reach the driver.

Because the spring which the Vickers booster employs to center the valve is lightly loaded, this spring has very little influence on the steering. As previously mentioned, it is merely necessary for the driver to overcome the friction in the steering gear plus slight valve friction and the spring load. The Vickers gear demands the lightest effort on the steering wheel. Furthermore, this gear will not transmit road-feel to the driver and is somewhat lacking in directional stability. It will not self-right on coming out of a turn, and the gear becomes virtually irreversible, regardless of the characteristics in the manual gear. It will absorb all road shocks.

With regard to the Ross-Bendix and Saginaw-Bendix integral gears, because the pre-loaded centering springs maintain the valve in a neutral position until a certain steering resistance is encountered, a threshold is established below which the gears act like completely manual units. In this range the driver has the

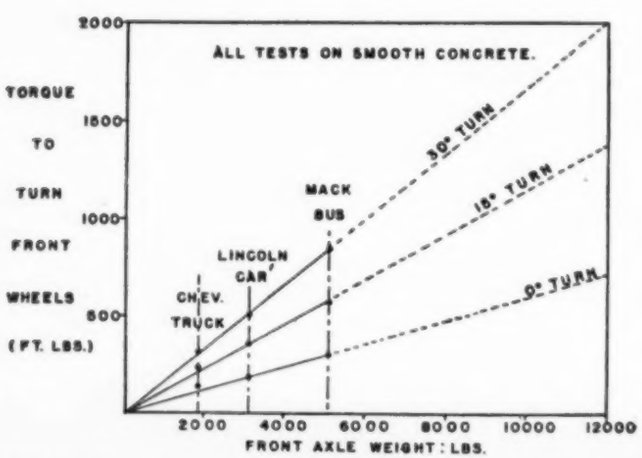



FIG. 5—Chart showing torque required to turn the front wheels.

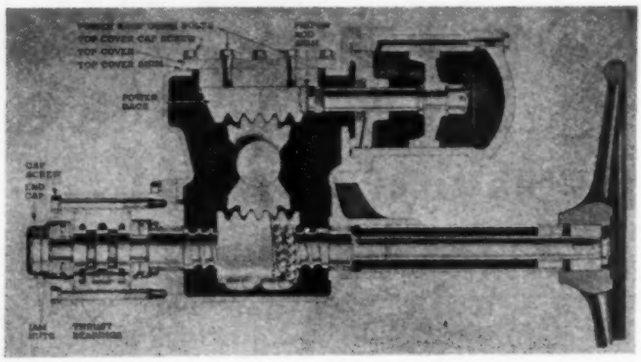


FIG. 4—View of Saginaw-Bendix integral hydraulic steering gear.

feel of the road, good directional stability and self-righting. Above this threshold the power cylinder comes into play and, while proportionality of hand effort to drag-link pressure is maintained because of oil pressure on the reaction plungers, the slope of the curve is greatly diminished. When the maximum output of the power cylinder is reached, the curve becomes parallel to that for manual operation, as is the case with the other gears described.

In the power gears under consideration, the steering gear worm, cam or screw in no case carries anything but the hand loads. This is the *delicate* part in a steering gear and is the part that must be protected from excessive shock loads. In fact, by reducing the forces that the driver must apply to the steering wheel, power gears also reduce the loads carried by these parts. This holds both for booster and integral types, for in the latter, the output of the power cylinder is fed in by a cross-shaft beyond the reduction gear. The booster type has the additional advantage that no steering or shock loads are carried by the steering gear housing but are transmitted directly to the chassis.

Before listing the requirements that power steering gears must meet, it is well to consider what we are trying to do to the steering system. We already know that the manual gear is a remarkably compact and efficient mechanism, and the only reason for considering the addition of power is to overcome the limitations of the manual gear. Safety indicates the desirability for furnishing complete manual control in case of failure of the power mechanism for any reason; therefore we are adding the power to existing steering gears.

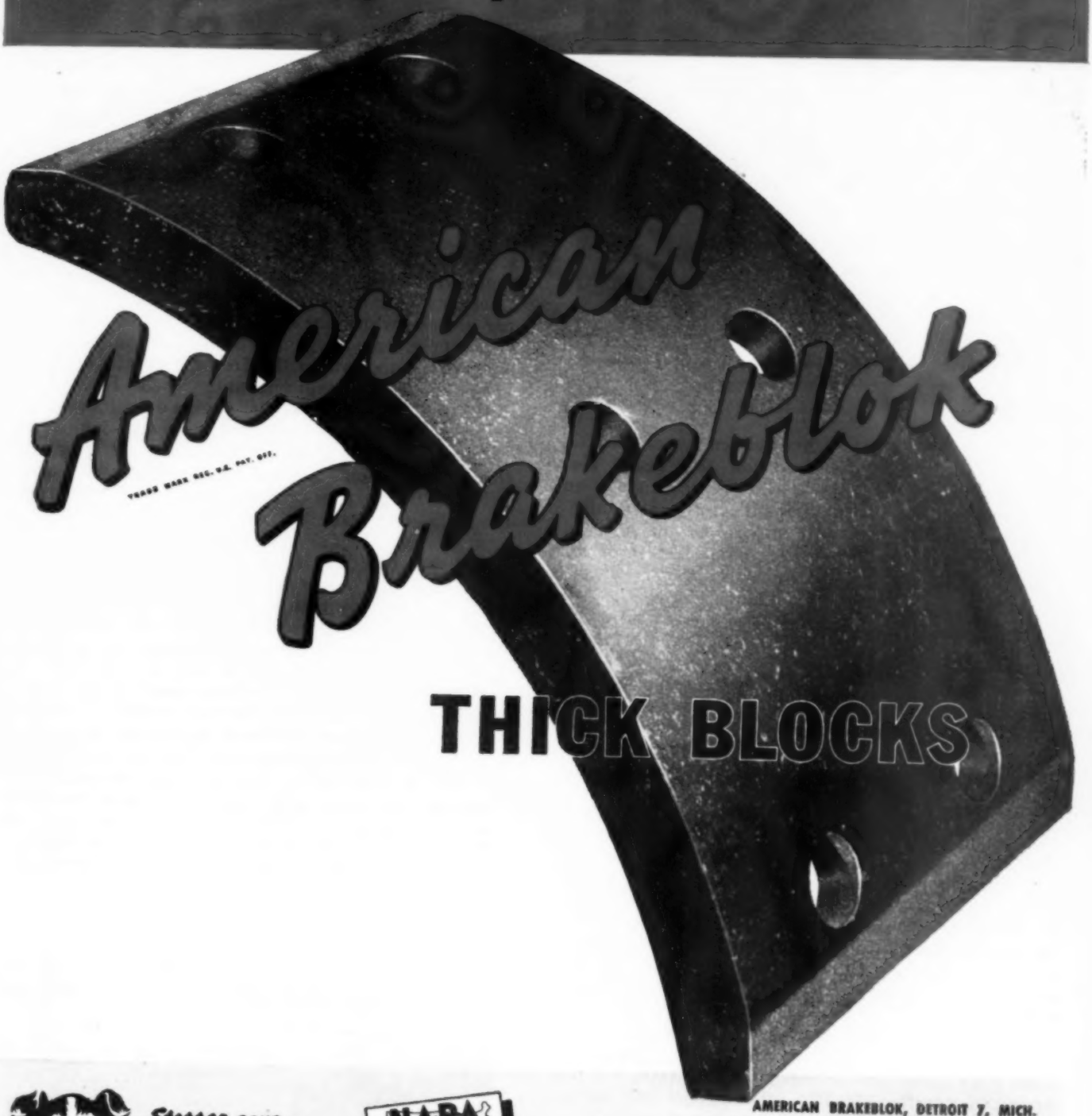
Perhaps instead of calling it power steering, we should use the term "power-assisted steering." The time may come when we can reduce the size of the manual parts or perhaps dispense with them altogether. However, at the present time, this move is not indicated, and, in view of the vital function of steering, it appears to the author that safety reasons alone will dictate the continuance of the manual elements.

The directional stability, self-righting properties, feel and absence of noticeable back-lash of the modern manual steering gear are qualities which should not be lost when power is added.

When we enter the field of heavy-duty vehicles, we arrive at a far more difficult situation, so far as steering gears are concerned, than is the case with pas-

(*Please turn to page* 120)

# Research has built more safe-stops per mile into—



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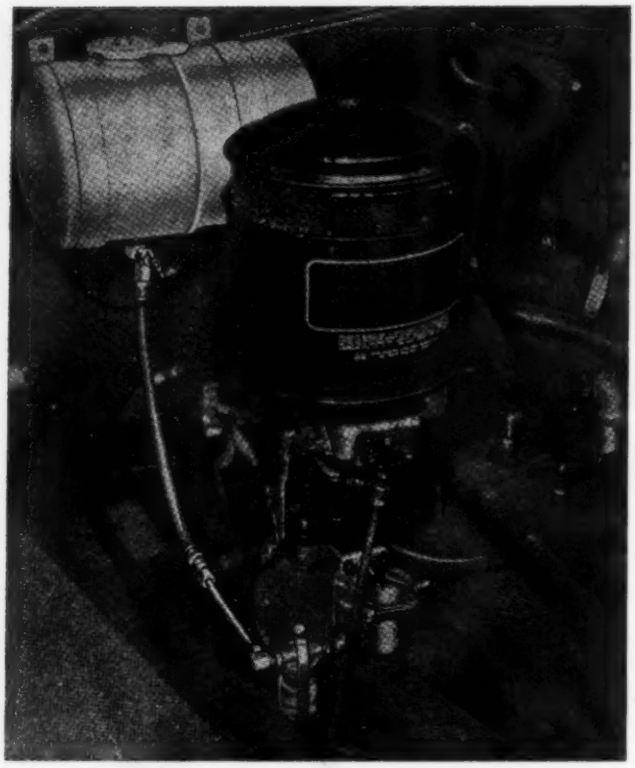

A typical installation of alcohol-and-water injection equipment.

# MORE ABOUT WATER-INJECTION

**MATERIAL IN THIS ARTICLE IS ABSTRACTED from a PAPER PRESENTED at SAE's RECENT ANNUAL MEETING by ENGINEERS of THOMPSON PRODUCTS**

THE December issue of this publication carried an article entitled *"Water-Injection for Truck Engines"* which outlined some results of tests made on Army trucks. In January the subject of water-injection was more thoroughly covered in a paper read before the War Engineering (Annual) Meeting of the Society of Automotive Engineers by A. T. Colwell, vice-president of Thompson Products, Inc. The following data, as well as the illustrations, are abstracted from Mr. Colwell's paper, in the belief that fleet operators may find it of interest.

The injection of water into internal-combustion engines as an internal coolant is old in the art. The subject has received renewed interest because of its successful use on aircraft engines recently. Remarkable bursts of power have been gained for take-off and during flight, proving beyond question the value of an injected coolant, particularly in supercharged engines.

Recent tests have indicated that alcohol or alcohol-water injection is superior to water in many cases. Tests made by Thompson engineers indicate that 100 percent alcohol is more effective than alcohol-water, but the latter is less expensive and quite satisfactory. The use of alcohol-water is not intended or expected to be a substitute for anti-knock quality in the fuel itself, but to supplement it and get maximum performance.

The effects produced by alcohol-water injection are not fully understood, but are probably a combination of the high latent heat of vaporization (water 970 Btu per pound, gasoline 150 Btu, ethyl alcohol 367, methyl alcohol 473, 50-50 ethyl alcohol and water 675 Btu) and some function of specific heat. Rich mixtures have commonly been used for their cooling effect, but are uneconomical. Under severe conditions, cooling of pistons, valves, plugs, cylinder deposits and the cylinder-head itself, suppresses detonation and pre-ignition, allowing higher power outputs.

So far as is known, any alcohol can be used. Extensive tests have been made with ethyl alcohol and some with methyl alcohol and isopropyl alcohol. The alcohols supply Btu's to the charge (about 12,000 Btu's per pound), which are not supplied by water, and they also supply some oxygen. Further, alcohol is miscible with water and lowers the freezing point appreciably (50-50 solution alcohol and water, —25° F.).

It has also been found that engine deposits are much softer and more easily removed when anti-detonant injection is used under variable load; on long, full-throttle runs, some engines were remarkably clean.

It was the purpose of Mr. Colwell's paper to present the following data on anti-detonant injection for ground vehicles: (1) The theory. (2) Some history. (3) Recent test data, including wear, corrosion, engine cleanliness, and mineral deposits. (4) A simple automatic anti-detonant injection device for ground vehicles, including cost of operation. (5) The possible field of use. Due to space limitations, no attempt is made to present the paper in full, and we limit this article to a few random excerpts which appear to be of most interest to fleet operators at present.

It is realized that additional equipment is needed on a vehicle for anti-detonant injection, and that the supply must be attended to, just as in the case of gasoline. However, there are some operations where the advantages are being recognized at the present time, and there is considerable general interest in the subject.

THEORY:—Every student of the internal-combustion

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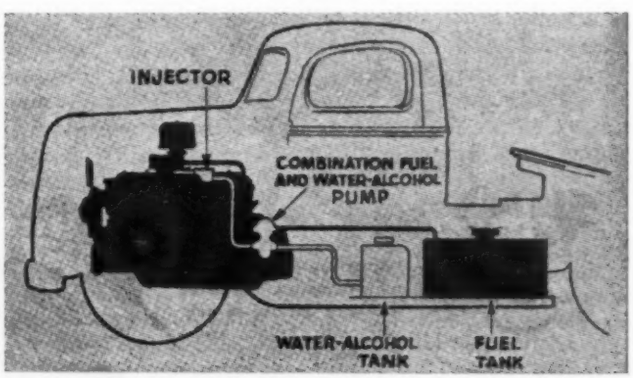


HOW alcohol-water injection equipment is installed on a truck.

Built of Alcoa Aluminum in 1926, this truck body originally had a 16-foot loading length. It weighed 1,600 pounds less than a similar body made of heavier materials. On the basis of one round trip per week, at a 1926 freight rate of $4.40 per hundred pounds, the heavier payload increased the truck's earnings $140.00 per week.

As highway load limits were raised, the carrying capacity of this truck was increased. In 1937, six feet of loading space were added to the aluminum body, and it was remounted on a new traction unit. In 1944, three more feet were added, and it was again mounted on a new chassis. Today, Lyon Van Lines estimate that this aluminum body is saving them $3,150 annually.

In these 18 years of constant service, not more than $50 has been spent on the aluminum body for repairs or maintenance. For information on how you, too, can save weight—and money—with Alcoa Aluminum, write ALUMINUM COMPANY OF AMERICA, 1974 Gulf Bldg., Pittsburgh 19, Penna.

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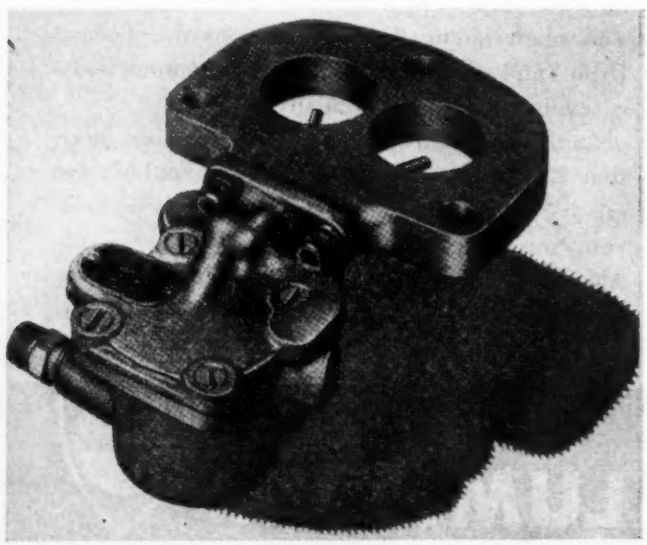
engine is aware of the importance of combustion control for good performance and satisfactory life. Recent developments indicate that much can be accomplished in the control of these variables by the introduction of certain internal coolants with the charge, at the proper time and in the correct quantity.

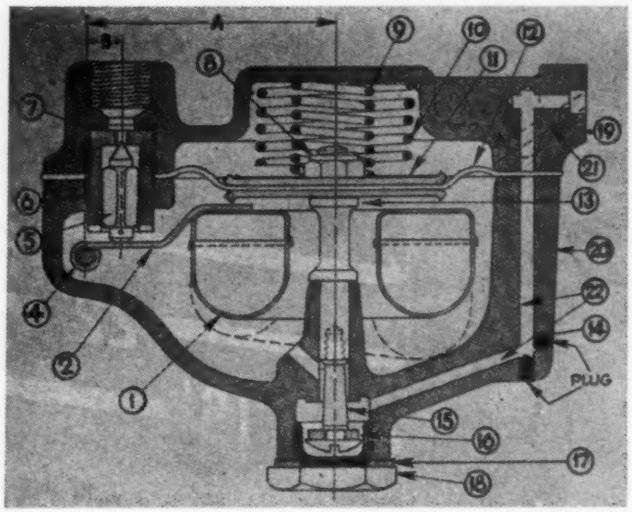
In determining the best cooling medium, when cooling alone is considered, it is natural to conclude that for this purpose the best coolant would be the one having the highest latent heat of vaporization—the required heat to change the liquid to a gaseous state —to be extracted from the air, or combustible mixture. The values for this property of the various liquids are given in the fourth paragraph of this article. To these should be added the statement that the heat required to change gasoline to a vapor is from 135 to 150 Btu. It is not conclusive, however, that latent heat of vaporization is the only factor involved.

Alcohol, when used alone as a motor fuel, has an octane rating of 90 to 100, but tends to have a higher value when used as a blending agent. Most of Thompson engineers' work has been with special blends of the various types of alcohols injected with the combustible mixture, using them only when required by the engine. Results indicate that burning characteristics of the charge are altered, reducing the rate of pressure rise, lowering peak values and fattening the indicator diagram. The bmep thus developed is therefore greater because the expansion pressure points on the diagram are in a more advantageous position relative to the crank throw, whereas a higher peak pressure may be so placed that the force applied to the crank is less effective in producing torque.

Water itself will reduce the degree of pressure rise and peak pressure (primary cause of detonation), but will contribute little toward fattening the diagram. However, if a slow-burning fuel, such as alcohol, is used as an anti-detonant instead of or with water, the peak pressure will appear at a greater number of degrees past top center and the diagram will have a flatter top, fattening the diagram on the expansion side.



THIS view shows injector unit mounted on special carburetor flange.




A cross-section of the injector unit described in this article.

At higher speeds, volumetric efficiency is decreased and turbulence increased, lowering the octane requirement of the engine. However, at the speed of maximum torque and slightly above that speed, maximum detonation and shock take place. This range, therefore, will require the maximum amount of internal coolant injection. Beyond this range, the quantity can be reduced or entirely cut off. (A device for automatic control is illustrated on these pages and will be explained later in this article).

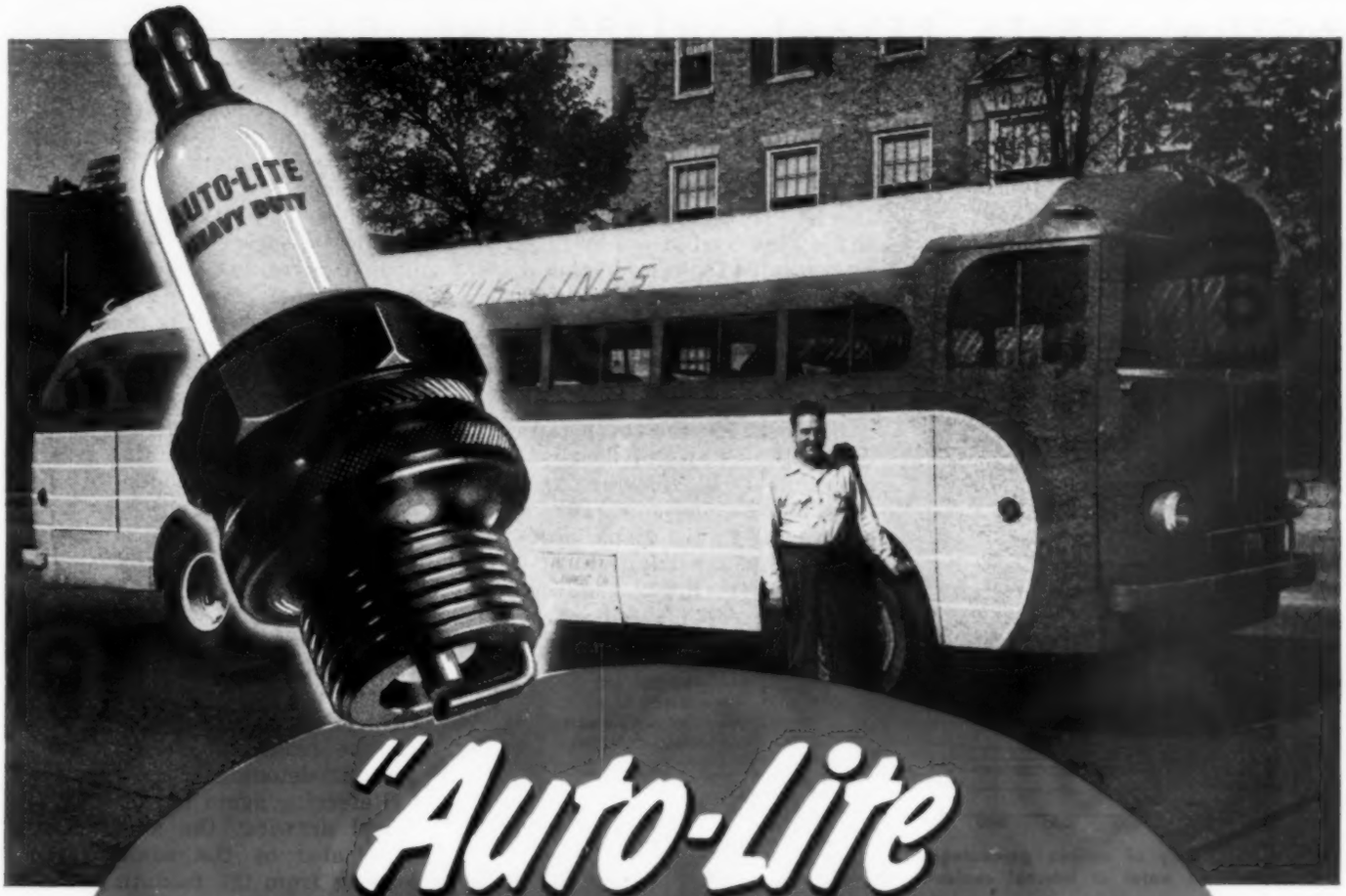
In truck service, however, where engines are operated at a continuous high power factor and at relatively high speeds, even though there is no audible detonation, it might be found desirable to continue to inject alcohol-water coolant beyond maximum detonating range to prevent pre-ignition.

When an engine is run on gasoline of the proper octane number, there should be very little benefit derived from the use of internal coolant injection. Best results are realized when there is a difference of approximately 10 to 15 octane numbers between the engine requirement and the fuel. The use of alcohol-water injection allows the use of lower-octane fuel than that normally required by the engine, or allows the octane rating of the engine to be raised for greater economy and performance.

An important factor having to do with engine life and maintenance expense is engine roughness caused primarily by high pressure rise during the combustion process. This is the condition which knocks out bearings and causes fatigue of engine parts, and is therefore more injurious than moderate detonation. Aircraft fighter pilots have reported smoother engine performance with alcohol-water injection. Almost every driver of an automobile is conscious of how much smoother and more powerful his engine seems during foggy weather. What is actually taking place is moderate water injection, giving some shock control. Tests by Thompson engineers show water injection to be beneficial in providing increased power and a smoother engine, but not equal to that which water plus alcohol or alcohol alone produces.

We must remember that one gallon of water results from the combustion of every gallon of gasoline and hence water vapor is already present in the cylinder.

(*Please turn to page* 92)




# "Auto-Lite HEAVY DUTY SPARK PLUGS Outperform 3 to 1 FOR US"

says **ROBERT GEDDES,** Supt. of Maintenance, Black Hawk Motor Transit Co.

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"Spark plugs were being changed every 10,000 miles," reports Mr. Geddes, "but since we switched to Auto-Lite Heavy Duty Plugs we have not replaced a single plug. To date each plug has been used over 30,000 miles." Switch to Auto-Lite Heavy Duty Plugs in your fleet and see how they help save time, trouble and expense. Ask your supplier, or write to

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# AUTO-LITE SPARK PLUGS

IGNITION ENGINEERED BY IGNITION ENGINEERS

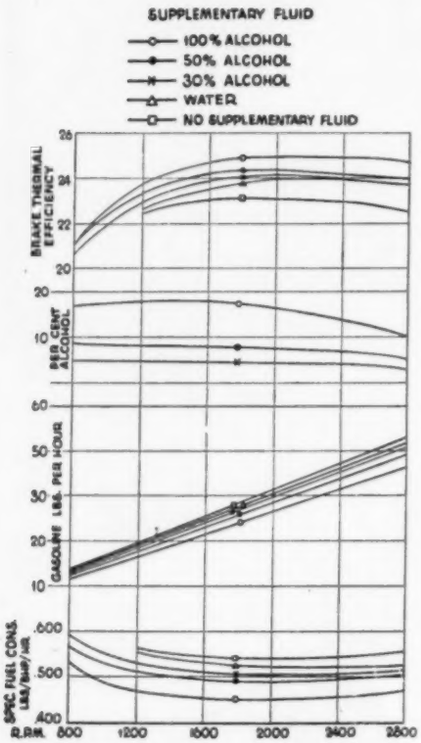



FIG. 1—Efficiency of various percentages of alcohol and water in internal coolant.

Higher compression ratios have ordinarily required addition of weight to the lower part of the engine. The method of shock control by coolant injection may be a means of increasing compression ratio without adding weight to the engine.

HISTORY:—Surprisingly few published data are available, even though tests date back to work done before 1900 in Hungary. Additional records show tests made in England in 1913 and in the United States in 1938. There is, of course, much confidential work now being done in this country, in connection with the military aircraft program. However, we can find nothing in the art where this development has been given a scientific approach in the light of the advance in knowledge of combustion engines. Much has been learned in recent years of how fuel structure, combustion-chamber design, air-fuel ratio, ignition timing, and temperatures affect the combustion process, and it is now common knowledge that military aircraft have recently taken advantage of the increased power possibilities of internal cooling, with exceptional results.

EQUIPMENT:—No attempt is made here to present data on any of the various types of water-injection equipment that may have appeared on the market. Instead, this discussion is confined to the automatic alcohol-water injector illustrated on the first two papes of this article. It was recently developed and is composed of five main parts; reference to the crosssection drawing show these to be as follows: The body casting (20), and the cover casting (19); the diaphragm assembly (12), which includes the springs (9) and (10) and acts as a gasket between the cover (19) and the body (20); the float (1), of doughnut type, allowing clearance for the metering pin (15), which is actuated by the diaphragm.

As the power requirement is reduced and the intake-manifold vacuum is increased, the diaphragm is

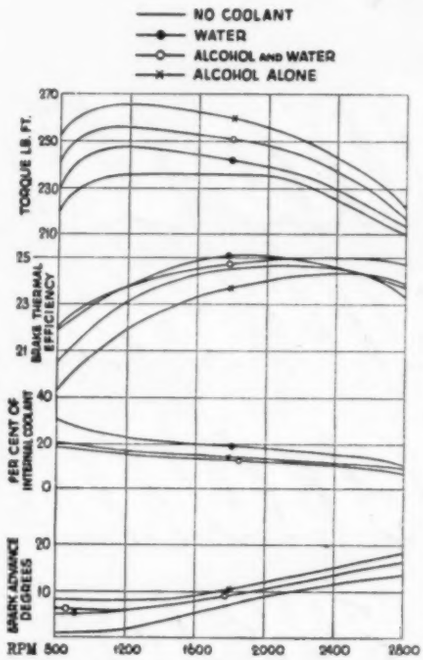



FIG. 2—A comparison of water, alcohol 50 percent, plus water 50 percent, and alcohol alone, when used as internal coolants.

drawn up, taking with it the metering pin which in turn decreases the orifice area. During the initial pin travel, or approximately 30 percent of the total travel, the spring (9) only is engaged.

According to the engine's requirement, the portion of the flow curve provided by the initial pin travel must show an increasing flow but a diminishing rate of increase. The flow curve is dependent upon manifold vacuum, spring rate and orifice area. The manifold vacuum is variable and increases from a few inches of water to 25 in. of Mercury. These vacuum values, cooperating with the springs (9) and (10), position the tapered metering pin relative to the orifice, so that a predetermined flow rate is obtained.

The spring (10) cooperates with the initial spring (9) only for the final 70 percent of pin travel and so serves in increasing the spring rate, thereby decreasing the final flow at the desired rate. Finally, at a predetermined point, the fluid is shut off when the valve seal (16) contacts the valve seat in the casting (20). The float maintains a fairly constant fluid level for all flow rates. When changing from low to maximum power, action is reversed and the flow curve conforms.

The method used to determine the most desirable flow curve for a given engine is described elsewhere. It is desirable that the injector follow this curve with reasonably accuracy, so that all of the benefits can be realized without waste of the anti-detonant.

Referring again to the cross-sectional drawing, the angular hole, designated by the numeral (21), leading from the mounting flange, and shown by the dotted lines, transmits the vacuum pressure from the manifold to the diaphragm.

The internal coolant, after it passes through the orifice, flows through channels, marked by nu-

(*Please turn to page* 94)

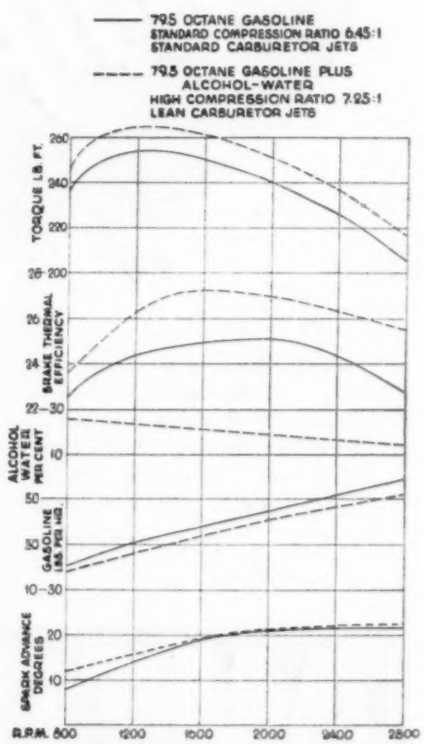
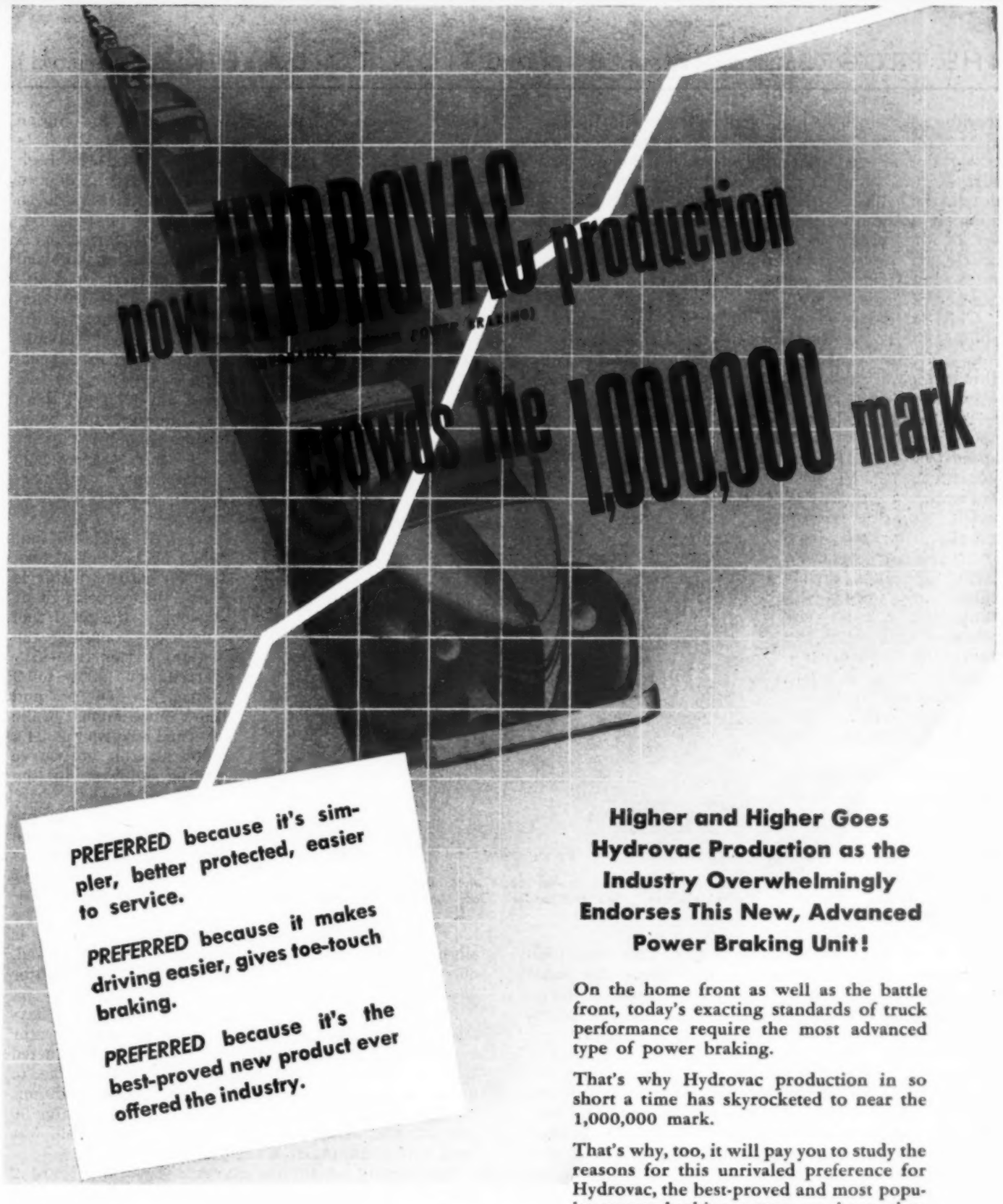



FIG. 3—Alcohol-water injection as a means of increasing engine power and efficiency.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meral (22), which in turn communicate with the nozzles in the carburetor flange, shown in another illustration. These nozzles supply the alcohol-water mixture to the carburetor mixture. Various types of nozzles have been tested, but it was found that the simplest design, a single tube with a hole at the center of the throat, is most efficient. The flange, of course, is placed between the carburetor and the intake manifold. A typical installation is pictured at the head of this article.

The foregoing description covers supplementary equipment for existing carburetors. In the future, it may prove practical to build carburetors incorporating this method of supplying supplementary fluid; in other words, dual-fluid carburetors are a possibility.

The alcohol-water tank can be mounted either above or below the carburetor level, depending on space available. If mounted above, no pump will be necessary, as the alcohol-water mixture will reach the injector by gravity. In cases where it is necessary to carry large quantities of alcohol and water, the tank will have to be mounted adjacent to the fuel tank or wherever space permits. A pump will then be necessary, preferably one in combination with the fuel pump.

Another illustration shows a schematic drawing of a truck installation, showing the alcohol-water tank mounted in proximity to the gasoline tank. The alcohol-water tank, in any case, need not exceed 10 percent of the fuel-tank capacity. This has been proven in actual service and represents the most economical size ratio. The alcohol-water pump should produce the same pressure as the fuel pump, but a much lower flow capacity will be adequate.

All metals and materials contacting the alcohol-water mixtures should be non-magnetic and non-corrosive. It is preferable that dissimilar metals do not contact. All gaskets, synthetic-rubber parts and non-metallic materials should be impervious to the alcohol-water mixture. Any swelling, shrinkage or durometer change over 10 percent cannot be tolerated in the rubber-like materials. If a metal substitute is used, distortion should be held to a minimum.

Service experience with the device and water-alcohol injection indicates that, in general, water suitable for drinking is satisfactory. However, in some cases a slime has formed, interfering with proper functioning of the equipment, and the use of distilled water will completely correct this condition. In no case has there been a report of injurious chemical deposits in the engine due to the use of alcohol-water.

TEST RESULTS:—Mr. Colwell's paper included 12 performance charts and one table, showing performance comparisons (determined by actual engine dynamometer tests) of mixtures with and without alcohol and/or water, from the standpoints of overall engine efficiency, internal cooling, power and efficiency, effects of low-octane fuel, rich mixtures, lean mixtures, high compressions, low compressions, etc. Again due to space limitations, but three of these tests will be illustrated and described here.

*Figure 1* illustrates the efficiency of various percentages of alcohol and water used as an internal coolant. A series of tests was conducted, using a six-cylinder passenger car engine of 217-cubic-inch displacement, 6.5:1 compression ratio, to determine the relative efficiency of various percentages of both alcohol and water from 0 to 100 percent in an internal coolant best suited for power and economy. The fuel used was 64 octane. The curves plotted from these data are reproduced in Figure 1 and show that when all factors are taken into consideration, 50 percent alcohol and 50 percent water is the best average combination, particularat the present price of alcohol.

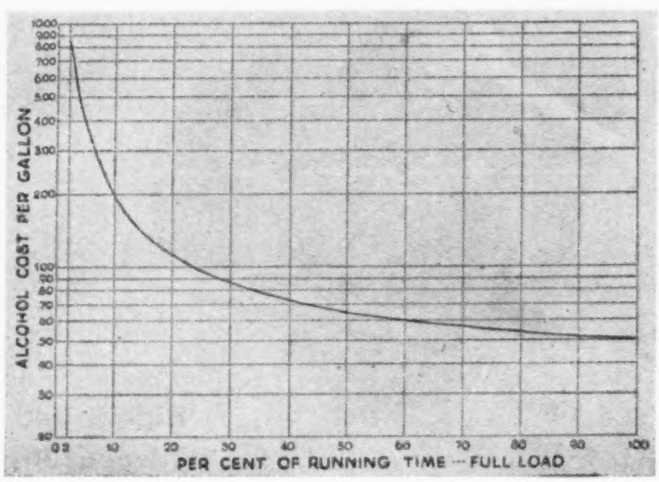


FIG. 4—Permissible alcohol cost when using cheaper gasoline with injection. See text under "Cost Analysis" for more data.

It will be seen that when 50 percent alcohol and 50 percent water is used, the percentage of alcohol in the total fuel mixture (excluding the water) varies from 5½ percent at 2,800 to 9 percent at 800 rpm and the maximum brake thermal efficiency is 24.4 percent; the bte curve falling midway in the family of curves.

Using water, the bte curve is lower than the lower curves, but this is not necessarily true of all engines, due to design differences. The water bte curve is slightly better than when no internal coolant was used, due to slightly higher power produced when water was injected.

*Figure 2.*—The test results shown in Figure 1 having indicated that a 50-50 mixture of alcohol-water is economically best, additional tests were conducted with a 318-cubic-inch, heavy-duty truck engine to ascertain the relative merits of three cooling mediums, namely: water alone, alcohol 50 percent plus water 50 percent, and alcohol alone. 69.8-octane gasoline was used with a compression ratio of 7.25:1.

The family of torque curves shown in Figure 2 indicates that water as a knock suppressor is inferior to alcohol or alcohol-water mixture for this engine.

While the brake thermal efficiency curve for water is practically the same as that for alcohol-water, it will be seen that the power developed at 1,200 rpm with water is 9.0 foot-pounds lower, or 3½ percent. The spark advance for water is the same as for alcohol-water, indicating good anti-knock properties for both mediums except that for the same degree of detonation, roughly 50 percent more water than alcohol-water was required. The power produced being greater for the alcohol-water mixture substantiates the statement made earlier in the paper that the heating value of

(*Please turn to page* 133)

## ARE YOU BUYING *Too Many* SPARK PLUGS?

When your spark plug replacements run unreasonably high, it is proof that you are using the *wrong* plugs. And the wrong plugs will impose still other penalties, in the form of *decreased engine power* and *increased operating costs.*

Plugs of the wrong Heat Range are just as wasteful as plugs of poor quality. They foul too quickly, or cause preignition, become coated with oxide, and misfire. This reduces engine power, wastes fuel, and makes frequent replacement necessary.

In order to get utmost spark plug efficiency, many operators select replacement plugs according to the AC Heat Range, and keep them properly cleaned and regapped every 3,000-5,000 miles. This holds performance up and costs down—and keeps spark plug replacement at a satisfactory minimum.

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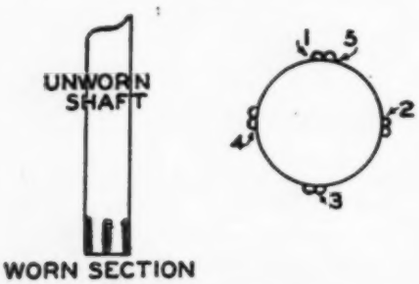
## BUILDING-UP WORN SHAFT

● Many mechanics in attempting to build-up worn shafts by welding, will often make the mistake of welding *around* the shaft, which may result in a warped shaft. Here's the *right* way to do it, as described by Tennyson Sherk, Port Colborne, Ont., Canada and sent to us by "Charlie" Davis of Lincoln Electric Company:




"Jack the shaft and clean up the worn part, or better still, grind off all dirt, rust and burrs. Now welding can be started.

"First weld a bead lengthwise with the shaft—not around it. Then go on the other side, weld another bead, in between the two welds, another bead, and then the same thing again. In this way you make a bead down each four sides. Now, start at the first bead. Clean off all slag, and brush well; then weld a bead beside it; then along No. 2 bead, then No. 3 bead, then No. 4 bead. (Always clean off all slag and brush before welding another bead.)

"Repeat on No. 1 bead and so on until the shaft is all welded around. Repeating welding on different sides equalizes the heat, and keeps down warping due to excessive heat in one place. Build up to oversize with weld, machining down to required size.

"When welding is finished, the shaft can be laid in a piece of angle-iron and clamped down until well cooled. Use plenty of heavy angle that will stand lots of strain. Now you will have to use some flat iron along each side, as near the thickness as the weld is over the size of the shaft. Put one along each side of shaft so as to have the shaft in line."

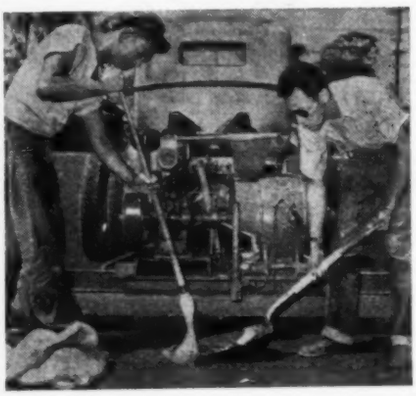
A better method, Mr. Davis suggests, might be to use the sequence, 1-3-2-4, instead of 1-2-3-4, as suggested above. Skipping to the opposite side of the shaft tends to minimize warpage.

●

## NAIL PICKER-UPPER

● Tires are vital to victory, and punctures sometimes delayed busloads of workers bound for war-vital jobs in the Honolulu, Hawaii, area. So an executive of the Honolulu Rapid Transit Company and a Westinghouse engineer went into a huddle—and into sundry used equipment storerooms and scrap-piles—and emerged with the rolling nail-and tack-hungry gasoline-electric-magnetic "whatsit," a scrap retriever, pictured here.

Creators of the unusual but highly



efficient device were W. A. Schilling, superintendent of shops and trolleys for HRT, and W. E. Eakins, Westinghouse engineer from Boston, Mass., who was in Honolulu on a special engineering assignment.

Welded to a long-I-beam "chassis" on the retriever are: A small air-cooled gasoline engine; an electric generator converted from a Westinghouse motor which had seen service with HRT in Hawaii since 1905; and some magnet coils salvaged from old street-car equipment. Small airplane wheels and tires turning on old street-car axles, machined down for the purpose, complete the device.

Turning at 1,310 revolutions per minute, the motor-now-a-generator produces direct current at 200 volts, 11 amperes, and this current energizes the magnet coils. The retriever is drawn by truck or bus over the routes of the HRT buses. When the current is turned off, metal scraps which have been collected drop to the roadway.

The photo shows Joseph Hale of HRT sweeping the retrieved tire menaces—nails included—into a scoop shovel held by Solomon Halemano. Since going into service, the retriever has picked up more than 1,000 pounds of scrap, mostly nails, and has reduced HRT outages due to punctures by about 15 per cent.

●

## PREVENTS FROZEN GAS-LINES

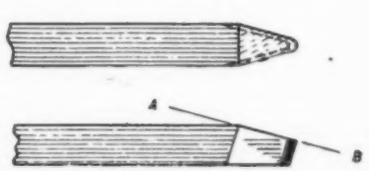
● When the mercury drops to 60 or 70 degrees below zero in the Fairbanks-Anchorage region in Alaska, alcohol is used in the fuel-tanks of commercial motor vehicles to keep gasoline from freezing, according to reports of motor freight lines operating in that territory.

●

## ARMATURE RE-TURNING

● Most fleet men occasionally have to turn down the commutator of a starter or generator armature, and there is a right way and a wrong way to do it, according to the SAE-ODT Maintenance Methods Committee, which offers the accompanying sketch and the following data on the subject:

"Sharpen the lathe tool as shown in the sketch. Set the point of the cutting tool *on*, not above the armature centerline. The tool should be




sharpened so that the line A-B is horizontal and passes through the armature center. Set lead to not less than 36 threads per inch. Take off the lightest cut that will just clean up the commutator."

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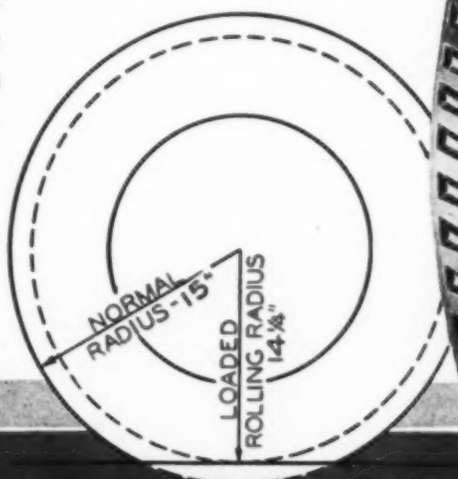

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### 283. *New 12-page Booklet on Low-Temperature Sludge*

If you enjoyed reading Mr. Bowhay's article on page 76 of this issue of your favorite publication, you can now get a complete copy of it in booklet form, for handy stacking, perhaps, in your "*Lubrication*" file. . . . The booklet contains the same text, same illustrations, etc., but the size is more convenient and you won't have to cut up this magazine. . . . The Texas Company has ear-marked a number of copies, which will be sent *free* on request. . . . Just mark No. 283 on our post-card and one will be mailed promptly.

•

### 284. *Truck Tire Handbook Brings You Up-to-Date on Tires*

A new 96-page "*Operators Handbook*", designed to assist truck and bus owners in getting more miles per tire, has recently been issued by Goodrich. . . . A few features are: (1) Helps select the right tire for the job. (2) Provides vital facts and data on tires, rims, wheels, etc. (3) Recommends procedure for proper tire care and maintenance. (4) Assists in obtaining lowest cost per tire mile. . . . Besides, it contains all those tables that you need to refer to from time to time, such as load and inflation, tube, valve and flap data, wide-base rim sizes, etc.; also a table of weights and measures. . . . Pocket-size, the booklet will be sent *free* if you mark No. 284 on our post-card.

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### 285. *1945 Data-Book on Edison Spark Plugs*

The new, 1945 data-book and size listing on Edison Spark Plugs is now ready. . . . This, you will recall, is the plug that comes complete with a built-in, leak-proof gasket, attached to the shell so that it can't get lost, and good for the life of the plug. . . . We understand that this feature of the Edison plug was temporarily discontinued, due to the copper situation, but that it is now back again on all plugs in the line, including a new type of heavy-duty truck plug. . . . The listings in this data book include a complete table showing the right type of plug for all installations; also a conversion table relating to interchangeability with other makes of plugs. . . . Number 285 on our post-card brings a *free copy*.

### 286. *The ABC's of Wheel Alignment is Title of This New Booklet*

Here is a handy little shop manual on Wheel Alignment Testing, done up in a 32-page booklet. . . . It gives, in illustrated form, the fundamentals of wheel alignment testing, explaining such things as caster, camber, kingpin inclination, etc., in a manner that will be understood by even the most inexperienced mechanic—and all of us must have at least a *few* of them in our shops just now. . . . You can get a free copy of this booklet by marking Number 286 on our post-card.

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### 287. *Schrader Catalog on Tire Valves, Gauges, Accessories*

The latest edition of Schrader's wartime catalog is now ready. . . . In its 48 pages you will find a wealth of data on tire valves, tire repair valves, valve-bending tools, tire gauges and other handy tire valve service tools. . . . The catalog covers all Schrader automotive products that are now available and also shows wholesale and retail prices. . . . There is also a special chapter on the evils of under-inflation in it. . . . For your *free* copy, just mark No. 287 on our post-card and mail.

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### 288. *Interesting Portfolio of Data on "Lubri-Gas"*

If you like to wade through interesting discussions on the subject of lubrication, done in a not-technical style, here's a portfolio of original articles, reprints, test-data, etc., offered by the makers of "Lubri-Gas". . . . The idea, of course, is to demonstrate the advantages of the auxiliary lubrication provided by this type of product, when introducing such lubrication through the motor fuel. . . . If you'd like a copy of the above, mark No. 288 on our post-card and we'll ask to have one mailed without obligation.

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### 289. *Booklet Illustrates and Describes Elevating Tail-Gate*

Fruehauf Trailer has now taken over the distribution of an elevating tailgate which can be fitted to almost any truck or trailer body. . . . It is power-operated, and lifts heavy loads from street-level to bed of truck body in a minimum of time, eliminating extra manpower and avoiding damage and accidents. . . . A new 12-page booklet contains pictures of many installations and shows exactly how it works. . . . If you'd like a *free* copy, No. 289 on our post-card will bring one promptly.

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### 290. *Facts About Glass Mats for Use in Storage Batteries*

A new 16-page booklet tells how "*Fiberglas*" battery retainer mats are used in storage battery construction; just what they contribute to battery performance and battery life; how they protect separators, retard shedding, minimize grid corrosion and produce beneficial effects. . . . The booklet is well illustrated and should have educational and reference value. . . . Number 290 on our post-card brings a *free* copy by mail.

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### 291. *Special Report on New Way to Clean Spark Plugs*

A specially-prepared service report is now available, describing a new method of cleaning spark plugs, to remove lead, carbon, rust and other deposits. . . . Plugs cleaned this way are claimed to have averaged over 22,000 miles service, in comparison to previous mileage of some 12,000 miles. . . . This new method of cleaning plugs (Oakite's) is said to do the job without disturbing glazed surfaces, thus retaining insulating efficiency. . . . For a *free* copy of this Special Service Report, mark No. 291 on our post-card and it will be mailed promptly.

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### 292. *New Chart Shows How to Install Truck Tire Chains*

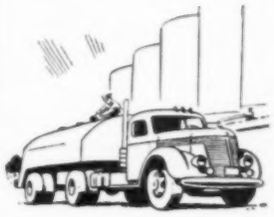
There are a lot of new men (and gals, too) in the truck and bus field who don't know the correct way to put on tire chains. . . . To help them (and to refresh the older guys, too) American Chain has prepared a simplified picture-chart, which covers both single and dual-pneumatic chain jobs. . . . Nothing is left to the imagination, as the pictures show step-by-step operations. . . . There will still be lots of snow and ice in many parts of the country, so if you mark down No. 292 on our post-card, we'll try to get you a free copy of the chart, *before* it melts away.

•

### 293. *Folders Cover Brake Booster and Hydraulic Clutch Release*

"*Univac*" is the trade-name of a new hydraulic brake booster for heavy-duty service on all types of commercial motor vehicles. . . . "*Hydrolease*" is a new hydraulic clutch actuator for the same types of motor vehicles. . . . Each of these new Pesco products is illustrated and described in new 4-page folders, which should be valuable when thinking of post-war truck and bus rehabilitation. . . . At any rate, they will serve to keep you informed on "What's New?". . . . Number 293 on our post-card brings copies without obligation.

In the 11 western states, approximately 90% of all franchise-operated, long-line, heavy-duty, diesel-driven trucks are powered with Cummins Diesels . . . the bulk of them Model H's.



Some 21 manufacturers of heavy-duty trucks offer Cummins Diesels —including the Model H—as standard or optional original equipment.

In industrial haulage, as on the highways, Cummins Diesels dominate the power picture. Example: On the Iron Range, more than 80% of the rubber-tired earth and ore moving equipment is Cummins-powered.

★

# Good— Yesterday Today Tomorrow

Now in its 13th year of heavy-duty automotive service and crowding the billion-mile mark in proved performance, the Model H Cummins Diesel—the *original* high speed diesel—is still kingpin of the highways. Tomorrow, there will be newer, more powerful Cummins Diesels to handle the load requirements of the larger trucks that are coming up. But that does not mean the passing of the Model H because, by any standards—yesterday's, today's or tomorrow's—"old Model H" is a good engine . . . a proved engine . . . an engine that will continue to give America's fleet owners faster, cheaper trips for a long time to come. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

# WHAT TYPE COOLING SYSTEMS ON POST-WAR TRUCKS?

GRIPE about grilles if you will! . . . Here's just the place to do it. . . . For many years we have listened to the complaints of fleet service men regarding the ills of cooling systems—and there was little (if anything) that *we* could do about it.

But now's your chance to do a little fancy griping that *may be heard*, since many post-war trucks may be started from the well-known "scratch".

This is now the *fifth* of our new series of post-war equipment preference surveys, and we need *lots* of replies in order to get representative opinion.

In return for your cooperation, you will receive a *confidential* tabulation of the whole survey—months before the condensed version is published in this magazine. . . . Your participation in this may help to get the things *you* want in post-war trucks.—*Editor.*

*(Please tear out and mail to The Editor, Fleet Owner, 90 West St., New York 6, N. Y.)*

## Question No. 153 — Radiators and Grilles

On post-war vehicles, what type of engine cooling would you want? ☐Water-cooled; ☐Air-cooled.

If water-cooled, what type of radiator? ☐Tube and Fin; ☐Cellular; Other Types? .....

What type of cooling system? ☐Sealed (*as in late model cars*); ☐Open-to-atmosphere type.

What improvements or accessories would you like to see on post-war vehicles? (*Check your choice below*)

☐Packless water-pumps; ☐More accessible drain-cocks; ☐Built-in overflow or surge tanks;
☐Larger drain-cocks; ☐More accessible hose-joints; ☐Built-in engine oil cooler;
☐Liquid-level gauge; ☐More accessible filler-opening; ☐Detachable cores and tanks;
☐Built-in rad. shutters; ☐Stronger radiator construction; ☐More fool-proof thermostats;

Other improvements in cooling systems? (*Please explain*).....

.....

What do you want in grilles? ☐Grille to *protect* radiator; ☐Decorative or ornamental; ☐No Grilles.

If you want a *decorative* type, what construction do you prefer? ☐Die-cast zinc; ☐Pressed steel, plated.

What type of construction would you want, so far as removal and replacement are concerned? (*Please check*)

☐Removable radiator without removing grille; ☐Removable radiator and grille as one unit;
☐Removable front-end assembly, including fenders; Other type? .....

Would you like a fan with *variable pitch* blades, controlled by thermostat? ☐Yes; ☐No; ☐Don't care.

If you'd like built-in radiator shutters, how should they be operated? ☐Thermostatically; ☐Manually.

Other than above, what improvements could you suggest in cooling systems for post-war trucks? .....

.....

Should radiators on post-war vehicles be larger than at present? ☐Larger; ☐Present capacity is o.k.

What *make* of radiator woud you prefer? .....(*Answers to this are confidential, of course*)

REMARKS: (*"Griping" is in order here, too*).....

.....

.....

How many vehicles in your fleet? (*Please indicate below*)

Trucks..... Tractors..... Trailers..... Pass. Cars..... Buses..... Miscellaneous.....

Mail THIS COUPON FOR FREE SURVEY

*Name of Firm*.....

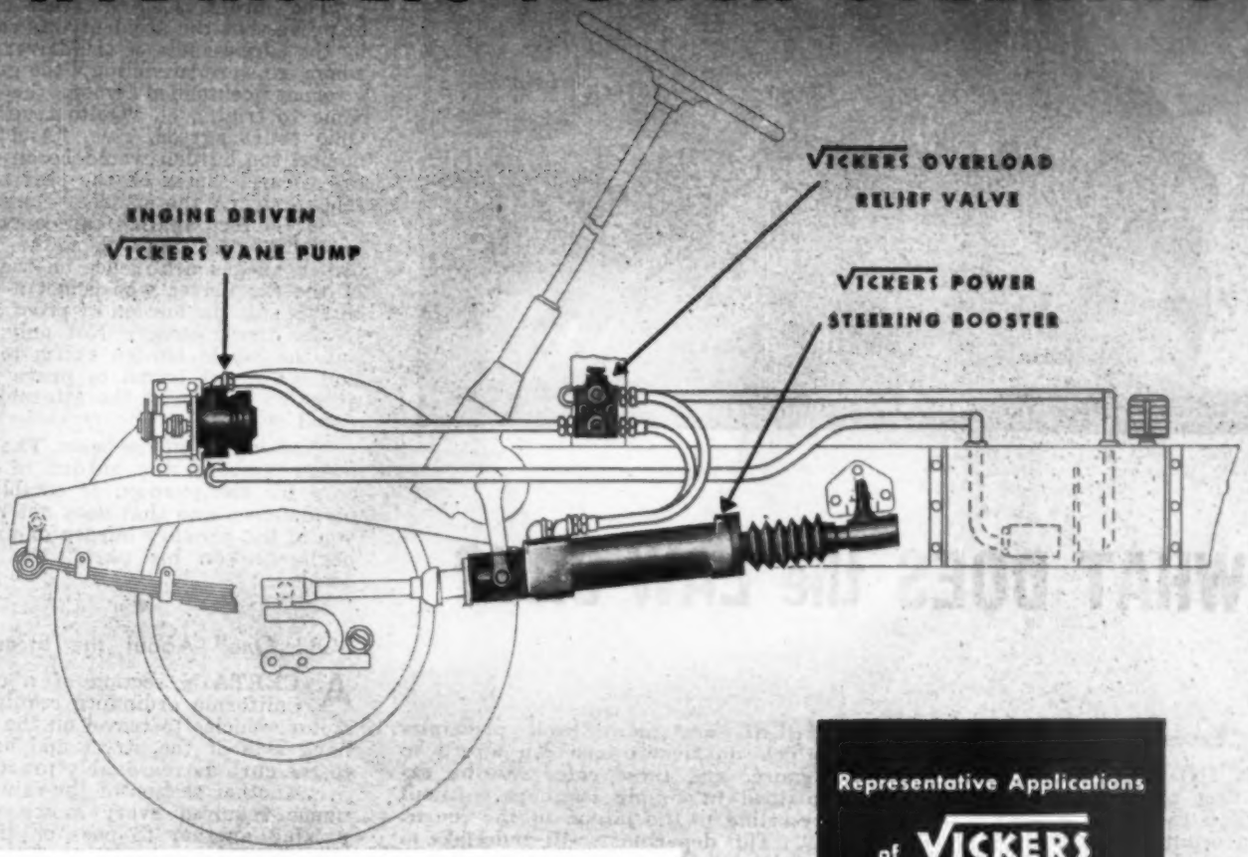
*Address* .....

*City and State*.....

*Your Name* .....*Position*.....

# COMPACT:

## Another Important Advantage of VICKERS HYDRAULIC POWER STEERING




Requiring only a minimum of space for installation, the Vickers Hydraulic Power Steering System can be applied to most existing hand steering mechanisms with a few simple alterations. The separate power cylinder (booster) can be located where it does not interfere with other apparatus and where the power will be applied directly to (and in line with) the drag link. No additional space is required at the end of the steering column where space is usually at a premium.

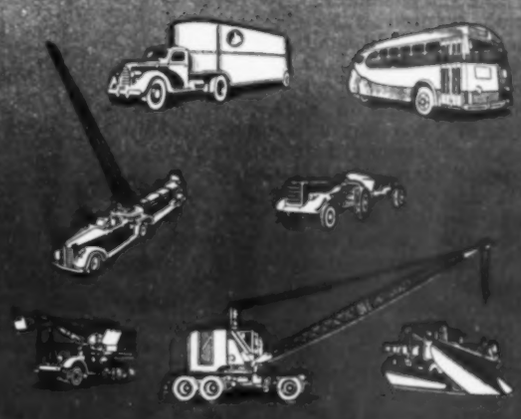
Other important advantages of Vickers Hydraulic Power Steering are: effortless, positive and shockless steering . . . road shock thrusts are transmitted to the frame of the vehicle instead of to the steering gear . . . automatic overload protection . . . reduced operator fatigue . . . greater road safety . . . automatic lubrication . . . and 15 years of successful operating experience. Bulletin 44-30 gives complete information about Vickers Hydraulic Power Steering; write for a copy.

**VICKERS** *Incorporated*

1422 OAKMAN BLVD. • DETROIT 32, MICHIGAN

*Application Engineering Offices:* CHICAGO • CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD
TULSA • WORCESTER

Representative Applications of VICKERS HYDRAULIC POWER STEERING



*By Rotor Swift*

# WHAT DOES the LAW SAY?

**THERE are many legal principles which no fleet owner can afford to ignore, and these rules *can* be explained in simple language, without resorting to the jargon of the courts. . . . This department will undertake to explain such general points of law, without using any legal terminology. . . . Each one is based upon an actual American court decision but all names are fictitious.—Ed.**

## "Excessive" Bond Is Invalid

AN INDIANA owner, operating a fleet of four trucks, was doing business in Iowa, and collided with an Iowa ordinance requiring him to put up an indemnity bond of $50,000 on each truck.

"My lawyer tells me that a law requiring an indemnity bond, for the protection of the public, is reasonable and proper, but that a 'confiscatory and prohibitive' ordinance is invalid," the truck owner protested. . . . "But a $50,000 bond on a truck the size of yours is neither confiscatory, prohibitive nor unreasonable," the collecting official pointed out. "Any one of your trucks could easily do more than that much damage in a single collision." . . . "But the premium on the bonds will come to $2,400 per year, and that's too big a burden for the amount of business I do in this state," the truck owner maintained.

"It is true that a single collision might result in the death of a number of people, wherein large damages might be recoverable. And it also is true that the truck owner is irresponsible, in the sense that in a few hours, he could remove all of his property to another state. But the owner would be required to give bonds for his four trucks in the sum of $200,000, at the expense of $2,400 per year for the bonds alone, and this in addition to the license fee and other requirements. . . . The amount of such bonds and the cost thereof are so large as to impress one at a glance that in that respect the ordinance is unreasonable and prohibitive," said the Iowa Courts in "quashing" the ordinance.

•

## The "Burden of Proof"

IF A's truck runs over B, and B sues A, the "burden of proof" is on B to prove carelessness on A's part. That is, B must prove that A was careless, and A is not bound to prove that he was not.

On the other hand, if A puts in a defense alleging that B at the time of the accident was neither looking where he was going nor going where he was looking, and that the accident was due entirely to the carelessness of B, then the burden is on A to prove carelessness on the part of B.

Consider, however, the case of the Ohio citizen who was a guest in a friend's car, was injured in a collision with an Ohio truck, and sued the truck owner for damages. The truck owner put in a defense denying everything and alleging that the injuries sustained by the guest were due entirely to the carelessness of the driver of the automobile in which the guest was travelling.

"The burden is on the truck owner to prove that the accident was caused by the carelessness of the driver with whom we were travelling," the guest's attorney contended when the case came to trial. . . . "Quite true," the Ohio court agreed. . . . "And ordinarily, the burden would be on us to prove carelessness on the part of the truck driver," the attorney continued. . . . "Correct again," the court concurred. . . . "But when the truck owner alleges negligence on the part of the car driver who is not a party to this suit the burden of proof shifts to the truck owner. Not only that, but the whole burden shifts to him, and we're not bound to prove negligence on his part," the attorney persisted.

"Now you're off the beam. The truck owner assumes the burden of proof only for the purpose of establishing his defense, and that does not relieve you of the primary burden of proving negligence on his part," the Court decided.

•

## "Old One" About the Street-Car

A CERTAIN section of a certain California ordinance required all motor vehicles to travel on the right-hand side of the street and as near to the curb as reasonably practicable. . . . Another section of the same ordinance required every motor vehicle passing another to pass on the left side thereof.

A California truck driver was travelling through the city in which this ordinance was in force, on the right-hand side of the street, and overtook a street car which was travelling exactly in the middle of the street. The truck driver held his course, passed on the right side of the street car, and was held up by a city policeman.

"The city ordinance requires an overtaking vehicle to pass on the left side of the overtaken one," the policeman explained. . . . "And the same ordinance requires drivers to travel as close to the right hand curb as possible, and that's exactly what I was doing," the driver pointed out. . . . "But that applies only until you overtake another vehicle." . . . "Partly true, but it still doesn't apply when the overtaken vehicle is a street car running on a fixed track." . . . And the California Courts decided that the truck driver was right.

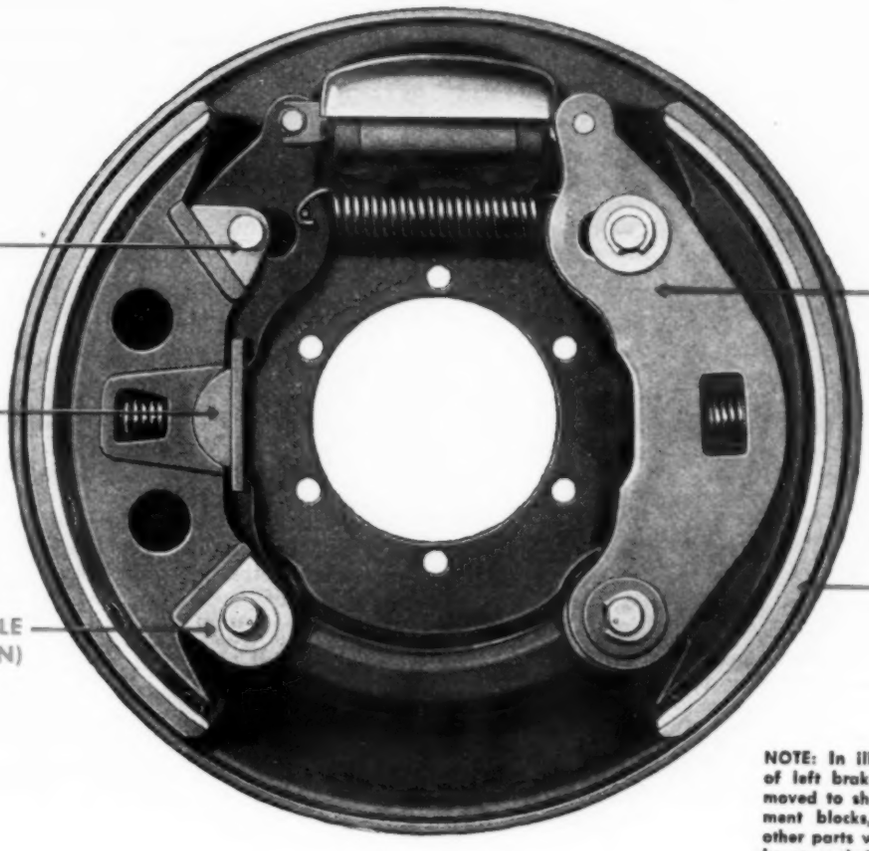
"Obviously, the word 'vehicles' does not include street cars, since they must travel upon a fixed track and cannot give way to the right. The ordinance applies only to vehicles that are able to turn to the right or left," the Court said.

*The new*

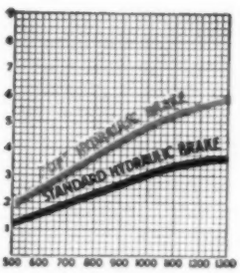
# TIMKEN "DP" BRAKE

DUAL PRIMARY

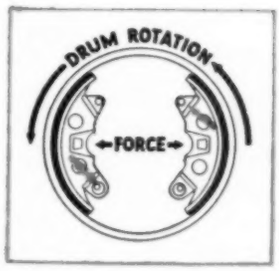
## medium duty series for hydraulic actuation

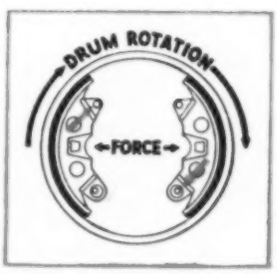

UPPER ABUTMENT BLOCK (ON FIXED ANCHOR PIN)
PRESSURE BLOCK
LOWER ABUTMENT BLOCK (ON ADJUSTABLE ECCENTRIC ANCHOR PIN)
BRAKE LEVER
BRAKE SHOE AND LINER

**NOTE:** In illustration above, half of left brake lever has been removed to show brake shoe, abutment blocks, pressure block and other parts which otherwise would be concealed from view.

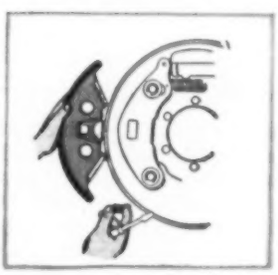



*30% to 35% greater braking ability at all hydraulic line pressures.*




*Both shoes are equally self-energizing, regardless of direction of drum rotation.*



*Shoes can be removed in a few seconds, with just a screwdriver.*

**Greater braking ability . . . longer liner life . . . complete driver control . . . utmost simplicity . . . equal effectiveness in forward or reverse . . . these and other features of the new Timken "DP" Brakes fully meet today's needs for the improved brake performance demanded by heavier loads and faster schedules.**

**Timken "DP" Brakes are available on certain vehicles now being produced. Write for descriptive folder — see how perfectly these modern brakes meet YOUR needs!**

***38 YEARS OF AXLE ENGINEERING LEADERSHIP***

TIMKEN AXLES — The Accepted Standard — D A CO

# TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT 32, MICHIGAN

WISCONSIN AXLE DIVISION OSHKOSH, WISCONSIN

# O.D.T. NEWS

## JOHNSON APPEALS TO NATION

● ODT Director Johnson last month called upon local transportation administrators throughout the nation to redouble their efforts to make their communities conscious of the critical transportation situation, and solicited their continued cooperation in handling the mounting wartime transportation load. . . . Col. Johnson made his appeal in a letter sent to each of the local transportation administrators, who serve in a voluntary capacity as advisers on local transportation problems in their respective communities.

●

## ODT GOT ITS SHARE

● Production of civilian transportation equipment was larger in 1944 than in 1943, ODT announced last month, in spite of heavy military demands and shortage of manpower, but it remained on a level far below that of pre-war years for many items. . . . As claimant agency for domestic transportation under WPB's controlled materials plan, ODT succeeded in getting into production nearly its full program for the year just ended.

●

## LESS THAN 1/4 IN 1945

● Less than one-fourth of the motor trucks estimated as needed to meet essential war and civilian transportation requirements during 1945, will be produced and distributed to commercial vehicle operators, ODT announced last month. . . . The estimate is based on the 1945 civilian truck program recently approved by WPB, the details of which appear elsewhere in this issue.

●

## TANK-CAR CHARGES UP

● To speed up the utilization of tank-cars in the movement of petroleum and other vital liquid commodities, the ICC, at the suggestion of ODT, recently revised its Order No. 263 to increase demurrage charges and reduce allowable free time on loaded tank-cars held at points of destination.

## WATCH YOUR BATTERIES

● Truck, bus and passenger-car operators are urged by ODT to make weekly check-ups of their storage batteries. . . . The appeal was made in a recent maintenance bulletin, calling for proper and regular storage battery maintenance, because of increased manpower and material shortages. In some ODT and WPB quarters, the battery situation promises to get worse before it gets better. . . . And this is *one* automotive part, the supply of which cannot easily be "hoarded".

●

## "CHICKEN ORDER" EXTENDED

● Two additional areas—one in the state of Georgia, and the other comprising parts of the states of Arkansas, Missouri and Oklahoma—were last month added to the recent ODT order prohibiting the transportation of live chickens by commercial motor vehicles in certain areas. . . . This applies only to the transportation of live chickens by common, contract or private carriers in the areas affected. It does not apply to local producers when transporting live chickens within (but not from) the areas affected.

●

## ODT RELEASES ANOTHER

● Last month ODT announced the relief from government possession of one more of the motor carrier transport lines which were taken over by the government on August 11th, following a labor disturbance. . . . The firm so released is the Wichita Forwarding Company, Kansas City, Mo., and is the fourteenth (of 103 midwest trucking concerns taken over last summer) to be returned to private operation. . . . ODT said that it has complied with the conditions of the WLB order affecting back pay and pay increases.

●

## RULES ON HORSES, DOGS, ETC.

● Now that the ban on horse-racing is in effect, ODT has added to the restrictions, prohibiting the transportation of passengers to or from horse, dog or motor vehicle races, whether they go by private automobile, taxicab, truck, bus, etc. . . . This is by means of ODT General Order 14-A, which also prohibits the transportation of horses, dogs or racing cars, if the animals or vehicles are for use or to be used in furtherance of any type of racing contest. . . . The order continues the ODT ban on automobile racing, which was lifted recently under certain conditions.

●

## TANK TRUCKS TO ODT

● Control of the transfer, conversion or diversion of used fluid-food tank trucks, tank-trailers and tank-tractors was recently transferred from WPB to ODT. . . . The transfer was effected through revocation of WPB Order L-1-j, issued in March 1943, controlling these vehicles, while ODT assumed control through General Order ODT 48, issued last month. . . . An amended directive of the ODT order to ration new commercial vehicles now delegates authority to ODT to include used commercial vehicles as well. . . . The provisions of ODT Order No. 48 are substantially the same as those of WPB's L-1-j.

●

## ODT WATCHES RENTAL CARS

● The ODT moved last month to bring the operation of rental cars in the Miami-Palm Beach area under closer supervision and control. . . . A new ODT Order (No. 46) affects drive-yourself cars in several Florida counties and calls for the lettering "Rental Car" to be affixed to each, in 2-inch letters on both door panels and rear deck panel or lid. . . . Operators of such cars are required to register same with ODT's Highway Transport Department and to file monthly reports showing mileage, as well as name, address and occupation of each person who hired a rental car, also his individual mileage.

●

## 258 CONVENTIONS CANCELLED

● Cancellation of 78 conventions scheduled for early this year, brings to 258 the number of such actions taken by organizations during 1944 and 1945 so far, in response to the requests of ODT, it was reported last month by Director Johnson.

# EASIER TO INSTALL

## MARMAN UNIVERSAL HOSE CLAMPS

Users of Marman Universal Hose Clamps report they are cutting installation time as much as 50%. Reason: tools or special adjustments are unnecessary with these flexible, high tensile stainless steel clamps. They're light and strong, can be used over and over without efficiency loss. No safety wiring required because of Marman's exclusive swivel-action nut. Non-slipping band conforms to hose contour, clamps irregular shapes with equal efficiency. Three sizes handle hose diameters from 5/8" to 3 5/8" O.D.

*Marman also makes standard fixed contour clamps and the popular Quick-Coupler in a complete range of sizes and shapes to fit any convex surface. Write today for new folder, Series 820.*

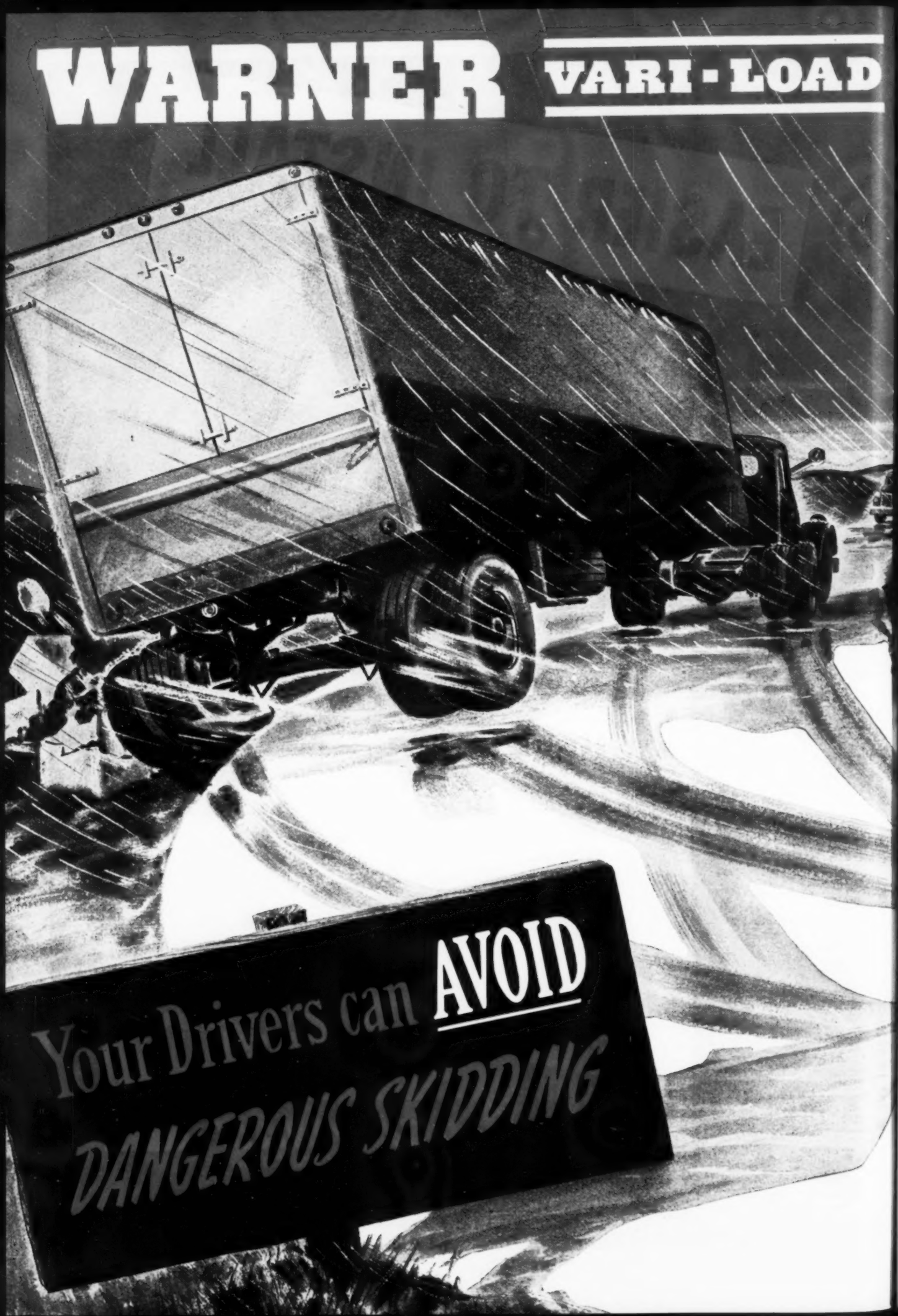
1. Retract screw fully. Wrap band around hose and insert end through opening in saddle.

2. Pull up snug, fold band down inside saddle, tighten screw.

TO TAKE OFF: Retract screw fully, press on screw, lift on free end of clamp.

**MARMAN PRODUCTS CO. Inc**

940 WEST REDONDO BOULEVARD
INGLEWOOD, CALIFORNIA


WARNER VARI-LOAD
Your Drivers can AVOID
DANGEROUS SKIDDING

# ELECTRIC BRAKES PROVIDE *Greater Safety*

EVER try driving one of your big tractor-trailer trains on slippery pavement? Until you do, you'll never thoroughly appreciate the hazards your drivers and *your equipment* face. The danger comes from *lack of braking control.*

How different with trailers having Warner "Vari-Load" *Electric* Brakes! The "secret" of their safety and efficiency is that the driver has absolute control of the brakes on the trailer.

At the first sign of slippery going, the driver can set the "Vari-Load" dial to *instantly adjust the electric brakes to fit the road and load conditions* — thus giving protection to himself and cargo — and preventing costly loss of time due to wrecked equipment.

On all future trailer purchases, specify Warner "Vari-Load" Electric Brakes — world-famous for safety, simplicity, and dependable, efficient, trouble-free performance.

**It is significant that 80% of all power-brake equipped trailing vehicles purchased by the government during this war—*have Warner Electric Brakes.***

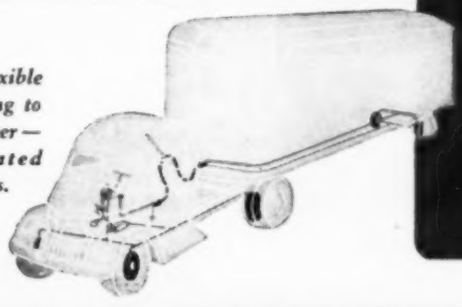
**WARNER ELECTRIC BRAKE MANUFACTURING COMPANY · BELOIT, WISCONSIN**

**NOW — Present Owners of Trailers with Warner Electric Brakes Can Have This New WARNER CONTROLLER**

The new Warner Controller — simple and compact — synchronizes the hydraulic brakes on tractor with the Electric Brakes on trailer. The tractor's regular foot pedal operates both braking systems. This development creates smooth foot-touch tractor-trailer braking under all conditions — eases driving strain — assures greater safety. Controller is easily and quickly fitted into hydraulic brakeline. See your Warner dealer about changing over your present equipment.

FOOT PEDAL PRESSURE CONTROLS BRAKES ON BOTH TRACTOR AND TRAILER

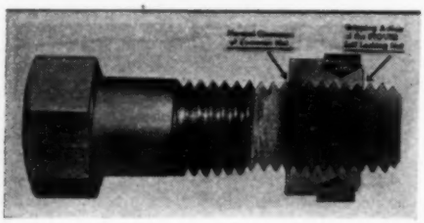
*Only a few flexible wires. Nothing to freeze or chatter— No complicated mechanisms.*



**WARNER**
**ELECTRIC BRAKES**

### Stover Self-Locking Nut

A NEW self-locking nut, designed to retain its grip despite vigorous vibration, is announced by Stover Lock Nut & Machinery Corporation,



Easton, Pa. It is now available in sizes from ¼" to 1½", with national coarse or fine threads.

Manufactured under a different principle than other locking nuts, it is said to act as a powerful spring which clutches the bolt, and that it will not shake off.

The result, shown in the accompanying illustration, is achieved by subjecting what appears to be an ordinary nut to a special compressing process, under which the upper part of the thread portion is made slightly elliptical, while the lower threaded portion remains circular. It is of one-piece design, requires no insets, washers or double nuts, and is precision-faced, so that standard wrenches will fit it.

In application, the Stover nut is screwed on a normally-threaded bolt in the usual way—about half way—after which a wrench is required to snug it up. Once the threads are entirely on the bolt, the nut locks itself automatically at any desired point, by utilizing the natural elasticity of the metal—usually steel or bronze. It can be used over and over again.

The makers offer to send samples to interested fleet men on request. Made by Stover Lock Nut & Machinery Corporation, Easton, Pa.

●

### New Barrett Brake Drum Lathe

A U. S. Patent recently awarded to Barrett Equipment Company, embraces eighteen claims on a combination stationary and portable brake drum lathe, president H. B. Barrett recently announced.

This device now makes it possible to easily machine heavy brake drums, without lifting either the wheels or lathe from the floor. It will accurately handle and turn any drum from motorcycle size to the largest truck or bus sizes with the tires on or off, and eliminates the necessity of hoisting heavy work for mounting on overhung shafts, according to Barrett officials.

This type of machine is now being used by all branches of the Armed Forces—Army, Navy, Air Forces and Marines—particularly in mobile operations, the maker points out.

Features stressed are: a great degree of precision work, speed of operation and a universal application to cover the entire field of drum sizes and weights.

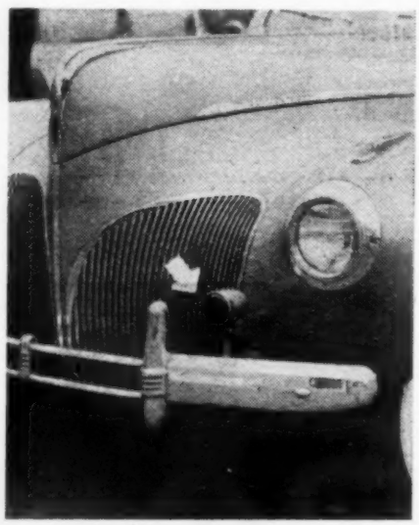
These machines are now available in quantities, providing WPB approval is obtained and allowing 30 days for delivery. For additional information write to Barrett Equipment Company, St. Louis 6, Mo.

●

### Automatic Headlight Dimmer

AN automatic dimmer, developed by Arrow Safety Device Co., Mount Holly, New Jersey, offers a quick and fairly simple solution to the problem of headlight-blinding. This little device takes the operation of dimming out of the driver's hands entirely. As the headlights of the approaching car get within the proper distance, a special light-measuring unit works the dimmer automatically.

Headlight-blinding has been recognized by leading safety authorities as responsible for a large percentage of night accidents. Anything that adds to driving-comfort and contributes to the safety of the highways should be a welcome contribution to post-war living.

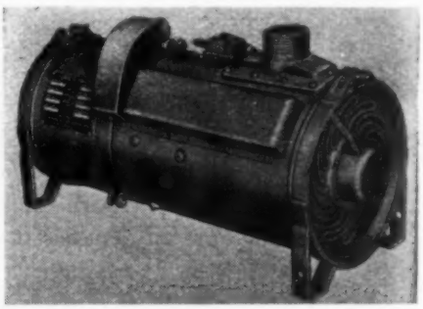


Arrow plans to start making these automatic dimmers very shortly, according to factory officials. All the preliminary work has been completed and production will begin just as soon as materials and plant-space are available.

●

### New Enclosed Combustion Heater

THE Herman Nelson Corporation, Moline, Illinois, announces a new type gasoline-burning heater, known as Model AT-1000 Vehicle Heater.



Designed primarily for application to heating requirements in vehicles and other ground equipment, it serves equally well as a space heater for personnel comfort or as a pre-heater for warming up various types of machinery, preparatory to operation in very cold weather.

Although heat output is 20,000 btu, the unit measures only 15" in length, the diameter of the outer shell being 6⅛". The weight is 17 pounds. Powered by an integrally-designed fan and electric motor, it is claimed that a new low-pressure principle of combustion results in a minimum of current drain on the vehicle's battery.

Installation requires only a supply of fuel and a source of electricity. Operation is fully automatic, being remotely-controlled by a simple on-off switch. It is pointed out that the heater fan can also be operated independently to provide unheated, ventilating air when desired.

Suggested applications of the new vehicle heater include heating of automobiles, trucks, commercial and house trailers, boats, temporary shelters, cabs of railroad track inspection cars, as well as pre-heating of many types of diesel and gasoline engines, construction machinery, etc.

Models are available for 6, 12 and 24 volts d. c. Present production, according to the manufacturer, is devoted to various special applications for the Armed Forces.

# When engines must keep going in heavy-duty service—get

# GULF DIESELUBE H. D.

**More and more** truck operators are switching to Gulf Dieselube H.D. because they find that this special heavy-duty oil stands up when the going is tough.

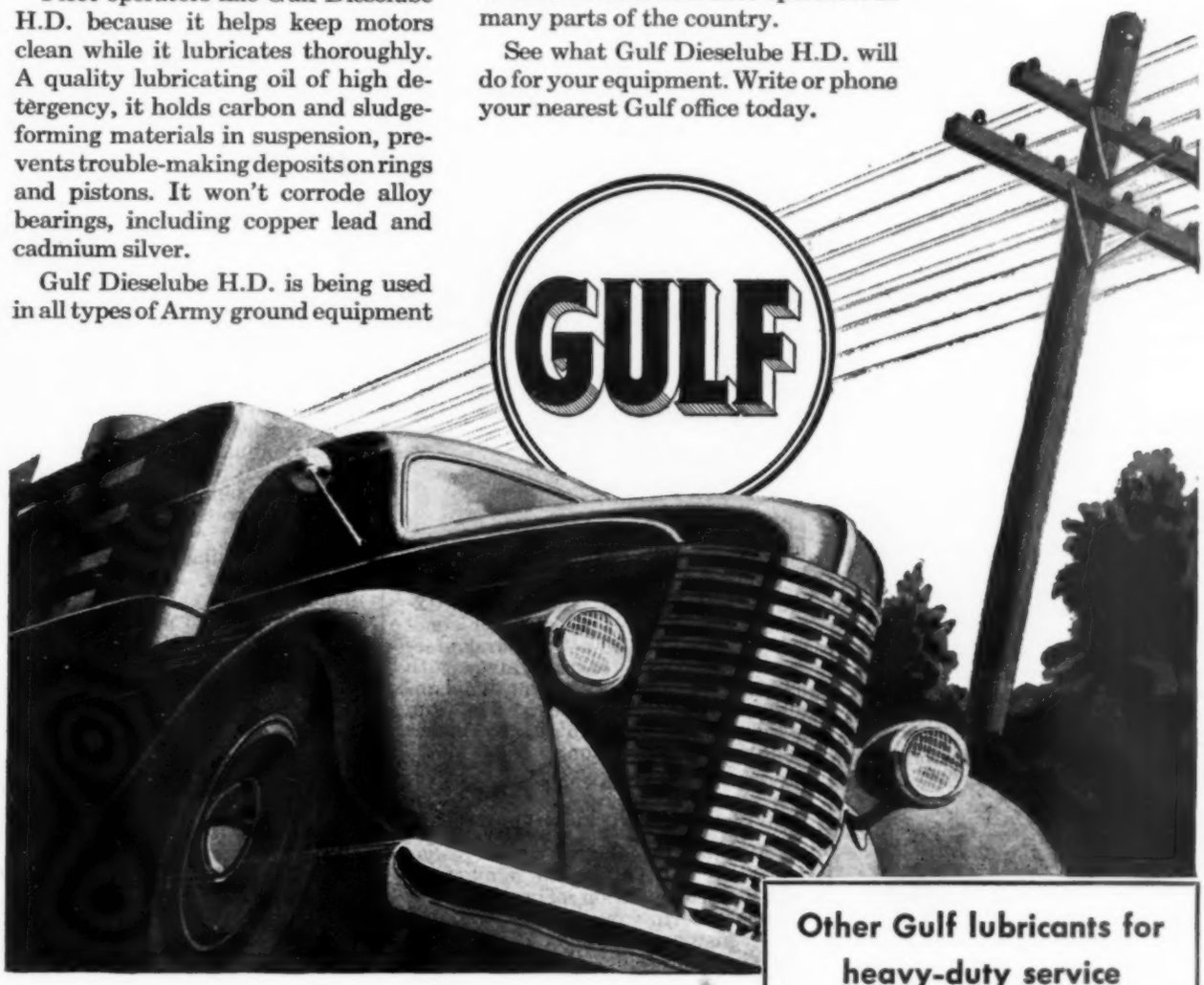
It is especially manufactured for improved lubrication of high-speed, automotive-type Diesel engines, and for gasoline engines operating under heavy-duty conditions.

Fleet operators like Gulf Dieselube H.D. because it helps keep motors clean while it lubricates thoroughly. A quality lubricating oil of high detergency, it holds carbon and sludge-forming materials in suspension, prevents trouble-making deposits on rings and pistons. It won't corrode alloy bearings, including copper lead and cadmium silver.

Gulf Dieselube H.D. is being used in all types of Army ground equipment —both Diesel and gasoline engines in trucks, busses, jeeps, tanks, tractors, and scores of other types—under the toughest operating conditions. It meets U.S. Army Specification 2-104B fully.

This high-quality oil is approved or recommended by leading manufacturers of gasoline and Diesel engines. In all kinds of heavy-duty operations, it's producing outstanding results for commercial bus and fleet operators in many parts of the country.

See what Gulf Dieselube H.D. will do for your equipment. Write or phone your nearest Gulf office today.




**GULF OIL CORPORATION**
**GULF REFINING COMPANY**

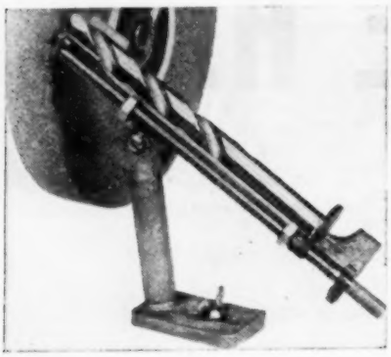
DIVISION SALES OFFICES:
Boston—New York—Philadelphia—Pittsburgh—Toledo
Louisville—Atlanta—New Orleans—Houston

**Other Gulf lubricants for heavy-duty service**

Gulflex Chassis Lubricants
Gulflex Wheel Bearing Grease
Gulflex Universal Joint Lubricant
Gulflex Waterproof Grease
Gulflex Graphite Spring Lubricant
Gulf Transgear Lubricant E. P.
Gulf Transmission Oils
Gulf Hypoid Gear Lubricant 90

### Makes Drill-Sharpening Easy

SHOWN here is a new product, the *"Super"*—a simple jig which facilitates the proper resharpening and



grinding of twist drills in quick time.

In use, the device is mounted next to a grinding wheel. It handles drills from 3/32" to 1-1/16" in diameter, and up to 11" long. It is adjustable to either 59°, 69° or 88° angles.

For illustrated literature and full instructions as to its use and operation, write to A. D. McBurney, 939 W. 6th St., Los Angeles 14, Calif.

•

### Data on Mounting Tubes

A PICTORIAL story on how to properly mount synthetic rubber tubes has been published and copies are now available upon request. . . . Step-by-step operations are described and pictured. . . . Published for free distribution by B. F. Goodrich Company, Akron, Ohio.

•

### New Hose-Banding Method

THE NEW *"Punch-Lok"* hose clamp shown here is available from ¾" to 48" inside diameter. This is described as a mechanical device for connecting various kinds of male and female fittings, nipples, pipe to hose, etc.

In making the connection, a broad, flat, galvanized steel band is double-wrapped around the joint. With the locking tool, a pull of 1,000 pounds is used to tighten the clamp, after which the ends are locked together and the excess band cut off flush with the clip.

Although various sizes are offered, the No. 3 clamp, with a ⅜" band,

seems most desirable for automotive work. The banding may be obtained in steel or copper-base alloy. . . . Made by Punch-Lok Company, 321 N. Justine St., Chicago 7, Ill.

•

### New Alemite Grease Gun

A NEW Alemite electric portable power grease gun, Model 7190, is announced by the Alemite Division, Stewart-Warner Corporation.

The new gun has been developed to deliver fast, positive, high-pressure lubrication with all types of lubricants that seek their own level. Equipped with large heavy-duty wheels for easy mobility, operation is further facilitated by means of a ball bearing front caster in the steering mechanism.

A quiet driving device connects the heavy-duty 1/3-horsepower electric motor to a high-pressure grease piston and cylinder, made of specially-treated and hardened steel, and fitted to close limits to prevent by-passing. A mercury switch automatically shuts off the motor when 5,000 pounds of pressure have been built up in the delivery hose.

The gun has an easily accessible check-valve and pressure-release

valve. Equipment includes a 12-foot electric cord, a six foot, one-quarter inch, 20,000-pound burst pressure hose and control-valve with hydraulic coupling, combination handle, cord and hose-rack. The gun stands 28½ inches high, 15 inches wide and 26 inches long.

•

### New Tune-Up Lube Booklet

HOW to safeguard upper valve-stems and valve-seats against excessive accumulation of carbon, and prevent scoring due to dry cylinder-walls, pistons and rings, is pictorially explained in a new booklet released by the Amalie Division, L. Sonneborn Sons, Inc., New York, N. Y.

The 8-page illustrated booklet entitled, *"4 Ways to Give Your Engine a Lift"* discusses the engine difficulties that may be encountered when corrosion, clogging and gum formations attack carburetors, tanks, combustion chambers and valves. Pointing out that re-boring and new pistons mean new-engine operating conditions, the booklet explains how their *"Gas-Lube"* helps shorten "breaking-in" time and keeps the engine operating like a job just tuned up.

Copies of the booklet may be obtained by writing on your business stationery to the Amalie Division, L. Sonneborn Sons, Inc., 88 Lexington Avenue, New York 16, N. Y.

•

### White's Tire Service Manual

AS A PART of its Personalized Service program, The White Motor Company is offering to truck owners a new maintenance manual on tires, which takes into consideration the vehicle conditions affecting tire life. The manual was compiled for White by the B. F. Goodrich Company of Akron and is based on the study of thousands of tires in use.

Recognizing that the maintenance of tires is a problem in itself, White decided to supplement the Personalized Service plan with a tire maintenance manual that would go the whole way in outlining conservation steps, thus overlooking nothing which would contribute to the life and efficiency of trucks.

As an opening to better understanding, the Tire Maintenance Manual indicates the vehicle factors affecting tire mileage and points out that operating conditions present varied problems. This is followed by a discussion of the individual vehicle factors, each in a separate section, prescribing how faulty conditions should be corrected.

The first section takes up Wheel Alignment as related to the front axle, and details the nature of and treatment for "toe-in", "camber", "caster", "king-pin inclination", and "toe-out". Photos and drawings illustrate this and all other sections of the book.

The second section takes up Wheel Alignment as related to the rear axle. This is handled in the same practical manner.

The third section is devoted to the Vehicle Frame; the fourth to Wheel Balance; the fifth to Brakes; and the sixth to the Fifth-Wheel. As indicated in the conclusion, "It is quite evident that there is hardly any part of the frame or vehicle undercarriage that cannot in some way affect tire performance".

# RAYTEX FORTIFIED

## DAYTONS GIVE PRE-WAR MILEAGE OVERLAND AT HIGH SPEED

### The Fighting Heart of a Dayton Thorobred!

has been battle-proved on the beachheads, and now again over here. It is a mighty combination of new synthetic rubber and stronger, more heat-resistant Raytex Cords. They are welded together into an inseparable union. Thus they distribute and "take-up" road-shocks, impacts, and heat . . . prolonging tire-life. It is new tire-engineering of the Dayton Thorobred . . . fortification that assures the delivery of Pre-War mileage, overland at high speed.

**Even under today's conditions, tires fortified by Raytex Cords are rivalling the mileage of pre-war tires, and doing it on the very toughest runs. They are Dayton Thorobred Tires.**

**Actual reports keep on coming in, direct from important fleet-owners, describing in detail the way today's Dayton Thorobreds can "take it."**

**Full capacity loads, tighter-than-ever schedules, runs day and night over mountains, long trips on hot straightaways . . . and "Overland at high speed" they say, "Daytons *still* give almost *all* of the good old pre-war mileage again." It is explainable only by Daytons "Heart" of the Thorobred Tire.**

**It is a "heart" of famous Raytex Cords. These cords are more resistant to heat. They generate less heat themselves, being lighter in weight, and more resistant to flexing. And they *retain* their greater tensile strength at unusually high road temperatures.**

**By a special process, these far stronger and far "cooler running" Raytex Cords are welded inseparably together with new synthetic rubber. Then all cords support and fortify each other. And thus "distribute" road-heat and road-shocks throughout the carcass of the tire.**

**Such a "heart" costs Dayton more, but it prolongs tire life, amazingly. And explains, too, why with Dayton Thorobreds blowout trouble is rare.**

**Countless fleet-operators all over the country, are getting the same longer mileage today, practically the same good old pre-war more-mileage-per-dollar, from Dayton Thorobred tires. And still have carcasses left that are excellent for recapping, and then many extra miles.**

**So although their supply is still limited, keep your eye peeled for a Dayton. Although more of them than ever are still demanded overseas, you may find some available. When you do, pick them up. They will help you, too, to maintain overland schedules, and *still* give you practically *all* of the same good old Pre-War mileage again.**

**THE DAYTON RUBBER MFG. CO.**
***Co-Operators of a Government Synthetic Rubber Plant***
**DAYTON 1, OHIO**

**★ KEEP ON BUYING WAR BONDS ★**

* *Dayton Processed Rayon Cord*

*Tires by*

**Dayton Rubber**

REG. TRADE MARK THE DAYTON RUBBER MFG. CO.

**The Mark of Technical Excellence in Synthetic Rubber**

# In the Automotive World

### Announce Nationwide Brake Program

THE International Association of Chiefs of Police has launched a program to place more emphasis on proper brake condition on motor vehicles. . . . Nearly 100 national organizations are cooperating. . . . Details of the program involve a check of brakes on vehicles stopped for law violations. . . . A similar effort last year in Michigan resulted in substantial reduction in traffic accidents, it is reported. . . . Dates for the new brake campaign are April 15 to June 1, 1945.

●

### National Grange Favors Federal-Aid

THE legislative program adopted by the National Grange at its recent 78th annual session, favors federal-aid for highways, apportioned to states on the basis of one-third population, one-third post-roads, and one-third main roads. . . . The Grange opposes continuation of interstate trade barriers and automobile use taxes, as well as federal gasoline taxes, which it considers as an invasion of the rights of states.

●

### New Car Tax Basis for England

A NEW basis of taxation for British motor cars that will permit them to compete in world markets on more even terms, but at the same time continue to protect their home market against American competition, was announced in Parliament recently by the Chancellor of the Exchequer. . . . The basis of taxation would be changed from 25 shillings per horsepower, calculated on a cylinder basis, to 20 shillings per cubic centimeters of cylinders.

●

### Big Driver Training Field Dedicated

PENNSYLVANIA recently dedicated its new $200,000 driver training field in Pittsburgh. . . . Started in 1941, the training field is the last word in scientific instruction of motor car operators. . . . Special instruments are used to test driving ability and coordination of drivers.

●

### Montgomery Uses U. S. Motor Vehicle

GENERAL Sir Bernard L. Montgomery, commander of invading Allied ground forces in Europe uses an American-made motor vehicle as his mobile field headquarters. . . . The giant truck has been with the famous fighting general on African and European fronts.

### Studies Size-Weight Regulations

THE American Association of State Highway Officials, at their recent annual meeting, has directed its executive committee to arrange for a thorough study of size-and-weight laws in the various states, with a view to recommending reasonable limits for interstate vehicles. . . . The resolution was aimed at the lack of uniformity in state laws and was termed "urgent".

●

### Oppose Air-Line Rights for Carriers

THE Air Transport Association is opposed to air-line rights for surface carriers. . . . This attitude was expressed in a resolution adopted at the Association's annual meeting, which opposed any change in the provisions of the Civil Aeronautics Act relating to air-line control by surface carriers.

●

WHAT a welcome the American GI's got in France. . . . The boys on this White Half-Trac, moving through liberated territory, are quite used to it by now. . . . It's even that way in German villages, 'tis said.

●

### Teletype Used in Car Service Plan

ONE passenger automobile manufacturer is using teletype service as a clearing house for information from branches and dealers relating to the servicing of its cars and procurement and distribution of essential parts. . . . Developed as a means of speeding war-time maintenance of essential motor transportation, the company sees great possibilities for its use in the post-war period.

●

### Russia to Expand Highway Transport

SOVIET Russia's post-war demand for motor vehicles will total at least 20,000,000 units, according to authoritative reports described as conservative. . . . Russia will build some of these vehicles but most of them will have to be imported.

### Sees 1½ Time Greater Auto Demand

THE demand for automobiles in the post-war period may be 1½ times that of the best pre-war years, President Wilson of General Motors Corporation told the Congress of American Industry at the recent annual meeting of the National Association of Manufacturers. . . . He estimated such an increase would lift General Motors direct employment to 400,000, against a pre-war peak of 250,000. . . . President Hoffman of Studebaker Corporation declared that the U. S. output of goods and services must be raised 30 to 45 percent over 1940, to achieve full employment after the war.

●

### Lack of Truck Tires Seen as Bottleneck

UNLESS there is immediate relief from the shortage of tires needed for replacement on trucks operating in New York, there will be a serious delay in transportation of war materials, the president of the N. Y. State Motor Truck Association stated recently. . . . "In many instances, vital shipments of war materials are being slowed down because of the lack of tires. . . . Failure to relieve this situation in the near future will mean that many vehicles carrying essential merchandise must be held up," he said.

●

### Motor Vehicle Registration Drop

THE Public Roads Administration has estimated that motor vehicle registrations during 1944 reached 29,846,000, a decrease of 4,626,000 from 1941. . . . "It is notable, however, that only 654,000 of the decrease occurred between 1943 and 1944, and that of the 654,000, only 11,000 were trucks". . . . They expect automobile registrations in 1944 to have totaled about 25,270,000, and state: "It is reasonable to expect 1945 registrations to approach 24,500,000, if no new cars are available, and to exceed that figure if a considerable number of new cars are produced."

●

### Rural Traffic in Illinois Declines

TOTAL traffic on Illinois rural primary highways in the three-month period of July, August and September 1944, was 46 percent less than in the corresponding period of 1941 and 5 percent less than a year ago. . . . The seasonal traffic peak was obtained in August as usual, but was much less pronounced than in previous years. . . . August traffic was only slightly greater than in July and September.

●

### Coffee, Doughnuts for "Red Ball Express"

IT ISN'T exactly "Joe's Place" on U. S. No. 1, back in the States, but the closest thing a lot of G. I. drivers operating on the famous "Red Ball Express" route in France have seen to it, is eight American Red Cross club-mobiles which ply the highway with hot coffee and doughtnuts. . . . The American girls who operate the mobile lunch stands offer a thrilling sight to these drivers and come in for a great share of praise from all concerned.

# MOHAWK
## Recapping Materials
## *provide the Life of*
# 2 NEW TIRES
## FOR 60% OF THE
# PRICE OF ONE

WHEN new tires are so hard to get, making the old ones wear longer is a necessity.

Dealers tell us that a Mohawk Truck Tire, not seriously injured, is good for at least two new treads and that its life is materially lengthened when Mohawk Recapping Stock is used.

Actually, fleet owners report they can get the life of two new tires for only 60% of the price of one by having their tires recapped with Mohawk materials.

Mohawk specialized on truck tire recapping stock long before the war. This had become a large business—one on which Mohawk had established a reputation.

Dealers using Mohawk materials now have ample supplies to give you immediate service.

*If you can get Mohawk Tires, better buy them.*

*

*(That goes, too, for Mohawk Recapping Materials.)*

THE MOHAWK RUBBER CO., AKRON 5, OHIO

# by MEYERCORD

Meyercord Truck Decals ride the sky-ways as effectively as the highways for Banfield Bros. Packing Co., Inc. of Tulsa, Okla.... providing lasting, colorful identifications... and product promotion... at a fraction of hand painted costs.

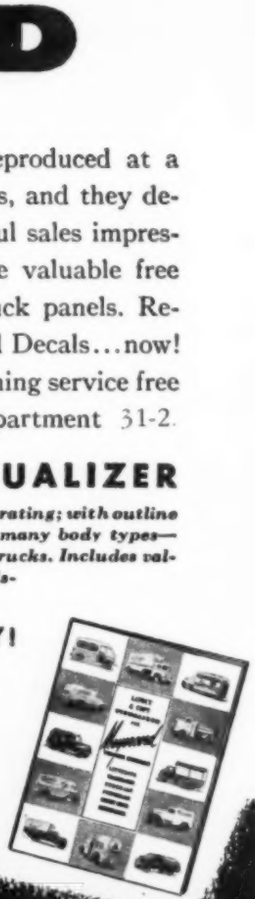
Identify YOUR fleet distinctively... deliver miles of valuable sales impressions to "free" circulation from the "free" advertising space on every vehicle you operate.

Meyercord Decals are economical for a dozen or 1,000. Overnight application saves labor, money and idle truck time. They're washable, durable and weather-tested. Any design, in any size or colors, can be reproduced at a fraction of hand-painting costs, and they deliver 100% payloads of colorful sales impressions daily. Don't neglect the valuable free advertising space on *your* truck panels. Redecorate them with Meyercord Decals... now! Experienced automotive designing service free to fleet owners. Address Department 31-2.

## *FREE!* TRUCK VISUALIZER

***Contains helpful hints on lettering, decorating; with outline diagrams for experimental designing of many body types—from panel deliveries to vans and tank trucks. Includes valuable data for maximum use of advertising space on all areas of trucks.***

***Send for free copy TODAY!***



*Buy War Bonds... and Keep Them!*

**THE MEYERCORD CO.**

*World's Largest Decalcomania Manufacturers*

5323 WEST LAKE STREET • • • CHICAGO 44, ILLINOIS

# "Fine performance for us since 1927" ...that's DIAMOND T *reliability!*

"MY experience with Diamond T equipment began in 1927", writes W. Gordon Glendenning, president of Glendenning Motorways, Inc., of St. Paul. "Since that time I have been continually adding Diamond T trucks to my fleet, operating them under maximum loads in both long distance and local work."

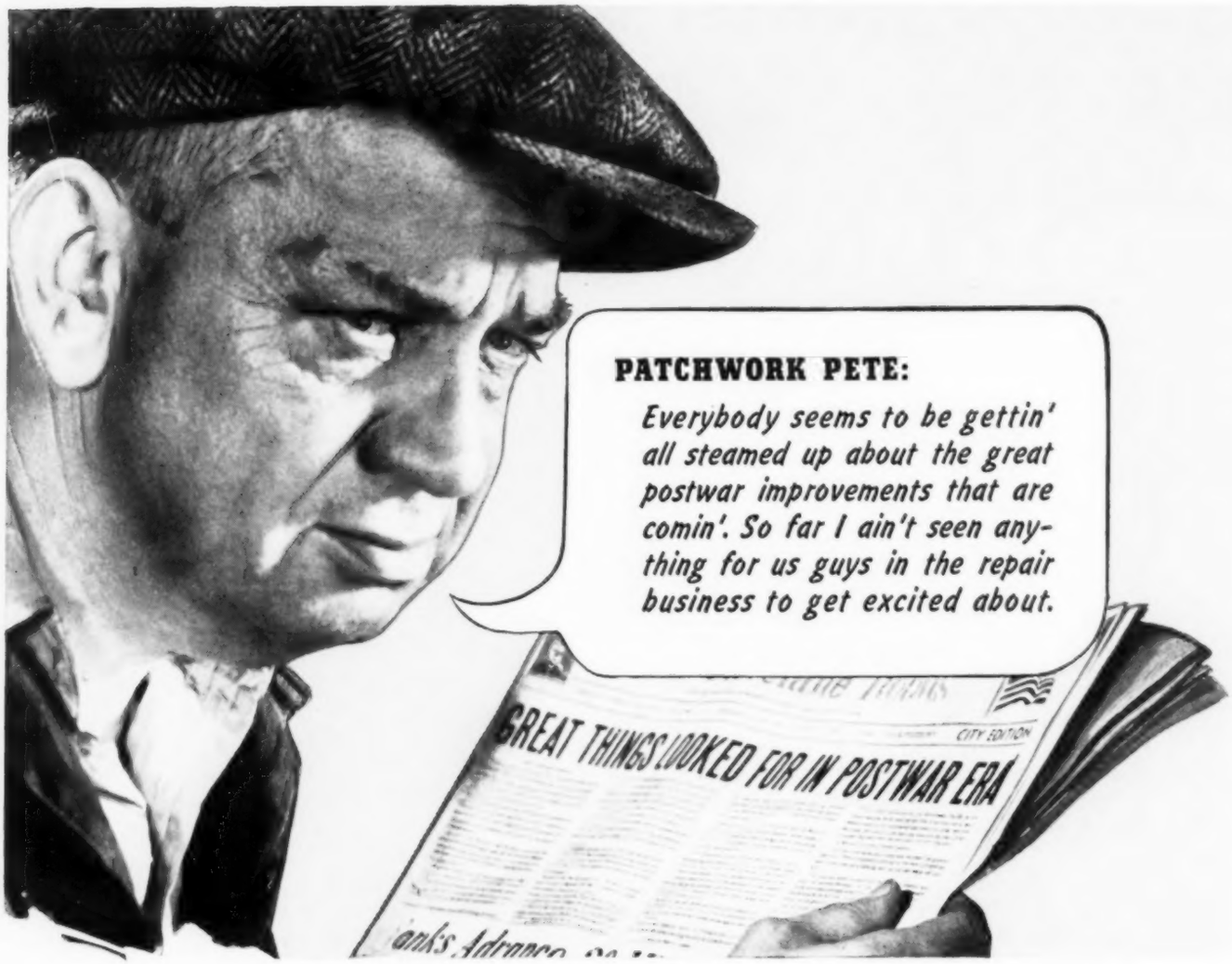
In the 18 years since 1927, Mr. Glendenning has had opportunity to become well acquainted with Diamond T reliability. His trucks operate between Chicago, Milwaukee, Twin Cities, Duluth, Fargo, Sioux Falls and Huron—in country where temperatures vary from a hundred above to fifty below zero. There is no tougher trucking weather. "My compliments on fine performance," is Mr. Glendenning's measured verdict.

From coast to coast, from Canada to the Gulf, thousands of leading operators share this opinion. They prefer Diamond T for dependable, economical, heavy-duty performance in all types of service. The Diamond T reputation for extra stamina has been in the making since 1905. It will be further advanced by the finer Diamond T's now being engineered for post-victory delivery.

*Diamond T has been authorized to build a limited number of commercial trucks at this time. See your Diamond T dealer if your service qualifies for Rationing Board approval.*

DIAMOND T MOTOR CAR CO. CHICAGO
*Established 1905*

# DIAMOND T TRUCKS


PATCHWORK PETE:
Everybody seems to be gettin' all steamed up about the great postwar improvements that are comin'. So far I ain't seen anything for us guys in the repair business to get excited about.
CITY EDITION
GREAT THINGS LOOKED FOR IN POSTWAR ERA

**YES,** *Thompson Products has great things coming for the users of automotive equipment and the mechanics who maintain and repair this equipment. Here are a few you can look for—*

**1.** The Thompson VITAMETER for truck and bus engines...and VITOL, the patented fluid it injects into the fuel mixture. Eliminates engine knock—boosts power. The same injection principle that gives an added burst of speed to America's fighter planes, *when the pilot needs it.*

**2.** Thompson SODIUM-COOLED VALVES (so spectacularly successful in aircraft) for heavy duty service in trucks, buses, and tractors.

**3.** Thompson ROTOVALVE that revolves as it works, lessening danger of "hot-spots"; longer valve life and better engine performance.

**4.** The Thompson BELTED PISTON that promises to revolutionize piston performance.

**5.** The NEW Thompson MAGNALINER (light-beam method of wheel aligning) simplified, more compact, super-accurate, FASTER—*streamlined* for postwar maintenance.

This is just a hint of many things to come from Thompson which will mean new opportunities and greater profits to the automotive repair trades, and improved performance and economy for car and truck owners.

*Keep Close to Your* **Thompson Products** *Jobber*

CLEVELAND • DETROIT • LOS ANGELES



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## TO GET EXTRA SERVICE FOR THE LONG PULL—*DEMAND*

# REEVES ARMY TWILL

***"FROM COTTON TO CUTTER"***

**Fleet operators from coast-to-coast specify *invasion-tested* Reeves Army Twill. Wherever durable, good-looking uniforms are needed, this top-quality fabric tailors smartly and gives superb service. Over 80 million yards of it have already been used to help equip America's fighting men, and it is proving itself under the toughest climatic and combat conditions of global war. This fabric, Sanforized Shrunk* and color-fast to sun, water and perspiration, will meet *your* post-war uniform needs. When the time comes to order them, choose from a wide range of popular colors, for long-lasting good looks insist on Reeves Army Twill.**

**Residual shrinkage less than 1%*

**THE REEVES FABRIC GROUP INCLUDES:** *Reeves Army Twill • Glengarrie Poplin • Reeveking Gabardine • Byrd Cloth • Marine Herringbone • Mountain Cloth • Warrior Twill*

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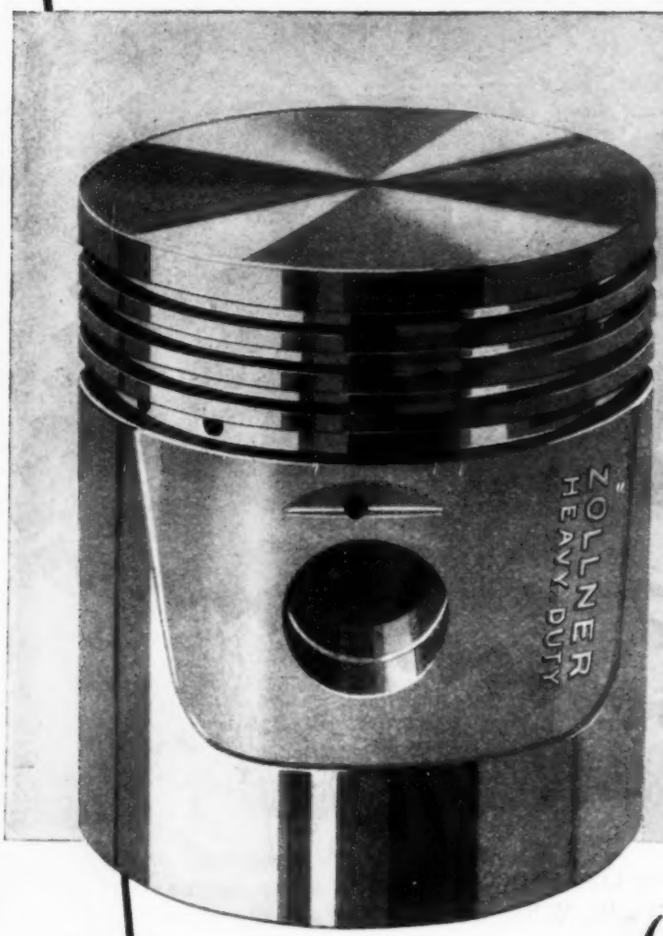
**54 WORTH STREET • NEW YORK 13, N. Y.**

*Representatives in Atlanta • Boston • Chicago • Dallas • Los Angeles • Philadelphia • St. Louis • Montreal • Toronto*

PROVEN BY EXPERIENCE

*Lower Maintenance Cost*

WITH THE PISTON TRUCK & BUS ENGINEERS *Recommend*

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ORIGINAL EQUIPMENT IN AMERICA'S FINEST ENGINES

FIRST CHOICE OF FLEET OWNERS FOR ENGINE RECONDITIONING

ARMY E NAVY

# ZOLLNER

## HEAVY DUTY PISTONS

For Internal Combustion Engines • Both Gasoline and Diesel

ZOLLNER MACHINE WORKS • FT. WAYNE 4, INDIANA

# What to do about Rust?

## Make this Test

Immerse any rusty nail in a small quantity of Cities Service Rust Remover. If badly rusted, allow to remain for several minutes. You can actually see the rust dissolve.

## See the Results

Remove nail and wipe dry with cloth or tissue. Note the complete absence of rust and the way the original surface reappears.

**CITIES SERVICE RUST REMOVER** has been tested for four years throughout a small, highly industrialized area in the East, where it has earned a unique reputation for performance. RUST REMOVER is a clean, clear liquid, practically odorless, non-inflammable, easily applied, and harmless to handle by those not allergic to specific chemicals. It is fast-acting, and, although heating somewhat accelerates results, general application is recommended at normal temperature (60°-90°F.). RUST REMOVER is effective on chromium, copper, aluminum, steel and iron.

## 5 Big Advantages

1. Non-Inflammable
2. Harmless to Normal Skin
3. Makes Metals Chemically Clean
4. Removes Rust by Chemical Action
5. Free from Muriatic, Sulphuric, Nitric and Oxalic Acids or Cyanide.

***See a Free Demonstration of Rust Remover on Your Own Equipment.***

*(Available only in Cities Service marketing territory East of the Rockies.)*

**MAIL THIS COUPON TODAY!**

**CITIES SERVICE OIL COMPANY**
Room 217
Sixty Wall Tower, New York 5, New York

Gentlemen: I'd like to test RUST REMOVER on my own equipment FREE OF CHARGE. Send me details.

Name_____

Company_____

Address_____

City_____ State_____

CITIES SERVICE OIL COMPANY
NEW YORK · CHICAGO

IN THE SOUTH
ARKANSAS FUEL OIL COMPANY
SHREVEPORT, LA.

**THE OIL FILTER BUILT ON EXPERIENCE**

*(not theory)*

The saving in oil and fuel—the many added weeks, months and years of engine life through the use of constantly cleaned oil are well recognized by experienced operators of motor driven trucks, buses, and cars.

In building Oil Filters for *millions of horsepower of engines*—MICHIANA automotive engineers have had the opportunity of knowing at first hand the vital requirements.

Whether you operate gasoline or diesel engines—on land or on the sea—here or thousands of miles away, you can get assured oil cleaning with MICHIANA Oil Filters,—longer engine life, reduced upkeep and long low cost, high efficiency performance. MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.

ARMY E NAVY

**MICHIANA OIL FILTERS**

## Low Temperature Sludge

*(Continued from page 82)*

Army Ground Force Vehicles. Any change in the type of oil used cannot be expected to improve cold engine sludging conditions." The oil used by the U. S. Army is of the heavy-duty detergent type meeting U. S. Army Specification 2-104 B.

*Recommendations*: Combining the experiences of fleet operators, engine manufacturers and lubricating oil manufacturers, the following recommendations are offered to prevent the formation of low temperature sludge in bus and truck engines:

1. Drain crankcase while oil is hot. Best time is immediately after engine is stopped following road operation. Draining of crankcase when engine and oil are cold is poor practice and leaves considerable quantities of used oil in the engine and sludge setttlings in the crankpan.

2. Increase oil drains if extended drain periods are being employed for one reason or another. Oil drains as frequent as 500 miles (or even less) may be necessary in some types of service and localities.

3. Check cooling system thermostat for complete closure when cold, and for proper operation when starting to open and when fully opened, at manufacturer's specified temperatures. Use higher opening temperature thermostat where necessary, to keep cooling system temperature at 160 to 180° F., depending on the type of anti-freeze used.

4. Cover radiator front to increase rate of warm-up. Also cover hood louvres completely during cold weather to increase underhood temperature.

5. Wherever practicable, enclose underpart of engine compartment completely, to prevent cold air from striking crankpan.

6. Clean crankcase breather inlet and outlet at frequent periodic intervals. Clean and re-oil breather air cleaner at same time, to prevent direct entry of dirt and dust into crankcase.

7. Clean and re-oil carburetor air cleaner at recommended intervals and more frequently if dusty operation is involved.

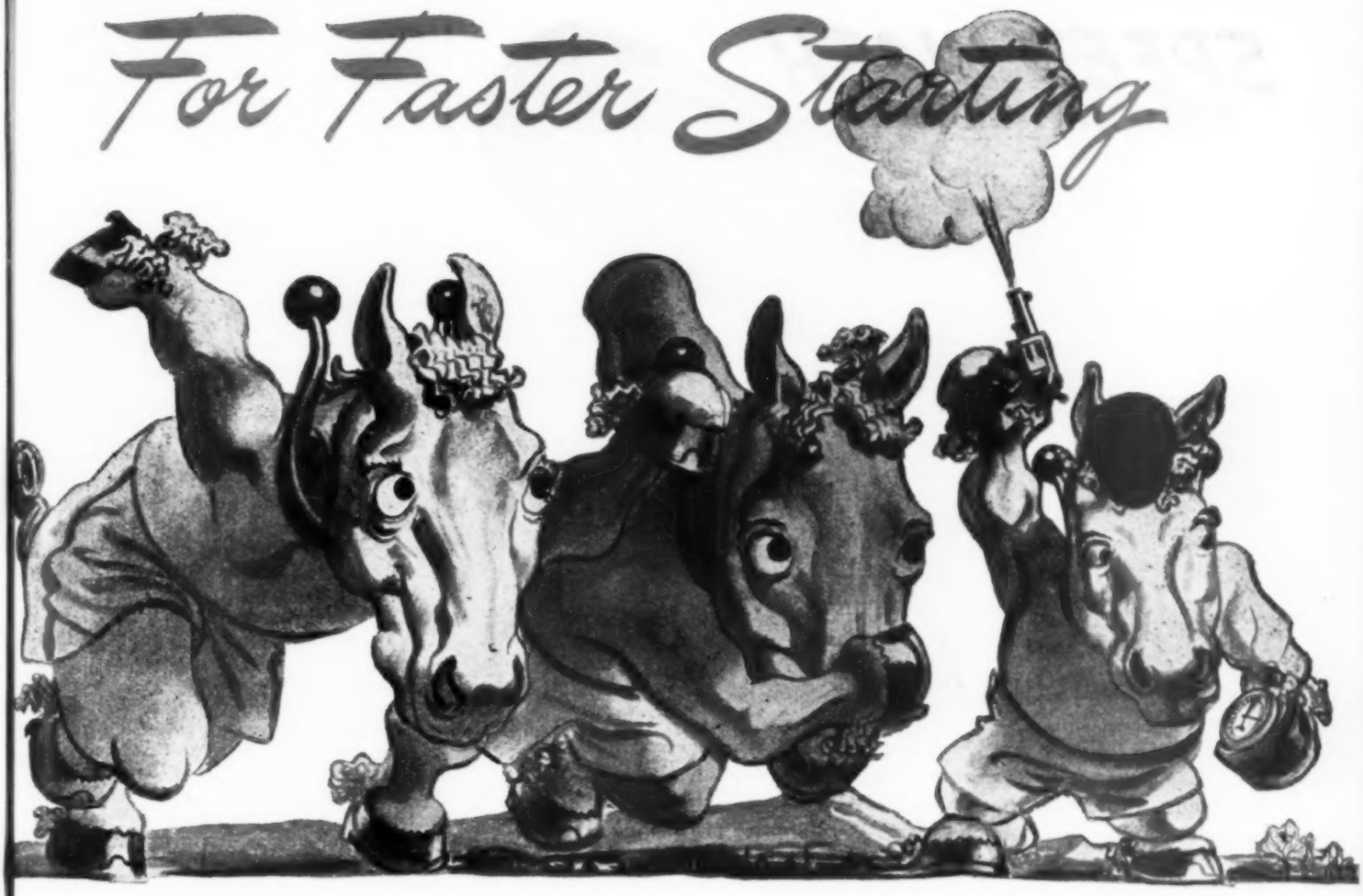
8. Use a good oil filter and replace cartridge at least at oil drains. Drain filter case periodically to remove water and clean case thoroughly at each cartridge replacement.

9. Refrain from idling engine to warm up in cold weather. Discontinue any winterization practices involving idling outdoors during cold weather.

10. Tighten cylinder head at periodic intervals, to prevent cooling system liquid leakage into cylinders and check cylinder head gasket where persistent leakage occurs.

11. Adhere strictly to scheduled maintenance items involving checking of ignition system, carburetor, and compression pressures, as well as other factors affecting proper engine performance. (*Cont. on page* 120)

# For Faster Starting



## AND SMOOTH RUNNING HORSEPOWER

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*Cleaning of Sludged Engines*: The foregoing recommendations are intended primarily for the *prevention* of low temperature sludge formation in automotive gasoline engines. When sludged engines are encountered it might be advisable to clean them quite thoroughly before applying the foregoing recommendations.

Complete disassembling for overhauling with its accompanying cleaning of engine parts is preferable. However, where overhauling is not fully justified the following procedure is suggested:

1. Drain crankcase immediately after road operation, while oil is hot.

2. Drop crankpan and remove side cover plate and valve chamber cover. Remove as much sludge as possible from engine parts and interior by scraping and wiping.

3. Where spray equipment is available, spray valve chamber and engine interior with kerosene or suitable commercial solvent.

4. Remove oil pump intake screen and any removable oil lines and wash thoroughly in kerosene or suitable commercial solvent.

5. Remove oil filter cartridge and discard. Drain oil filter housing. Remove as much sludge as possible by wiping and scraping. Where oil strainers are used, wash elements thoroughly in kerosene or suitable commercial solvent. Pressure washing of these strainers is the best method to insure complete removal of any interior deposits.

6. Wash crankpan, valve cover, side cover plate and oil filter covers in kerosene or suitable commercial solvent before reinstalling.

7. Install new oil filter cartridge and/or clean strainer elements. Fill crankcase with a suitable engine flushing oil. Run engine as recommended by manufacturer of flushing oil. During running, watch oil pressure gauge closely and if pressure drops suddenly, stop engine immediately and check for clogged oil pump screen or other causes.

8. After flushing run is completed, drain crankcase and oil filter housings. Install new oil filter cartridge and/or clean oil strainer elements.

9. Fill crankcase with lubricating oil to be used. Check oil pressure before vehicle is placed in service.

10. Change oil after the first 500 miles or 30 days in passenger car service. In bus and truck service change oil after the first 500 miles and again after the next 1,000 miles. This more frequent initial changing is for the removal of any further sludge deposits loosened by the lubricating oil.

CONCLUSION: The foregoing recommendations are believed to be those which the average operator should be able to place into effect without too much trouble. Employment of other practices discussed in this article should be at the discretion of the operator and after due consideration is given to the design of the equipment involved.

Although the information in this article applies primarily to automotive gasoline engine operation, it is also applicable for the most part to gasoline engines operating in all other types of service.

●

### Power-Steering for Trucks

(*Continued from page* 86)

senger-car steering problems. Modern heavy-duty vehicles require steering torques far in excess of passenger-car values, in some extreme cases exceeding 6,000 foot-pounds when stand-


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ing still. Cases in which the wheels must be turned under this condition arise perhaps more often for some types of heavy-duty vehicles than for passenger-cars, and the designer must keep this in mind when calculating steering forces.

Truck steering ratios range up to 100-to-1. While slower ratios are permitted because large vehicles are not expected to maneuver like passenger-cars, the actual ratios used, about 40-to-1 as an upper limit, are dictated by the need to allow the driver to maintain steering control, and even this with the assumption that the drivers of such vehicles will have more muscle power than the average passenger-car driver. Perhaps we may expect him to exert a maximum pull of 80 to 100 pounds on the steering wheel; however, this is a rather high figure and exceptional physical strength should not be a requirement for driving one of the larger vehicles.

Data on the steering torque obtained with different vehicles and various conditions are far from complete. Measurements of static torque in the passenger- car range have been published, but similar figures for the larger vehicles are not available except in isolated cases.

Estimates of torque have been made by using a coefficient of friction of .8 for a pneumatic tire on dry concrete, but this coefficient does not give us the complete answer, since the tire is not being dragged along but is rotated about the king-pin axis. This shape and area of the tire footprint affects the torque, as do other factors such as offset, caster, camber and the various frictions involved in the entire steering system. Additional data on this subject would be of great interest, and it is hoped that some agency will undertake tests throughout the full range of front axle weights.

Fig. 5 represents a test made on three different vehicles to obtain relationship between torque and front axle weight for various wheel positions. Measurements were made of the torque required to start the front wheels, to turn them through 15 degrees and to turn them through 30 degrees. These tests resulted in a straight-line relationship. Some isolated figures at hand indicate that in the higher range of axle weight, the ratio increases somewhat faster. The highest figure available is a turning effort of 6,840 foot-pounds to turn the wheels through 15 degrees, with an axle weight of 22,000 pounds. If we followed the curve in Fig. 5, we would arrive at a steering torque of 2,650 foot-pounds, considerably below the measured figure.

The reversibility of the modern steering gear and its tendency to transmit road shocks to the driver's hands, has been mentioned earlier. At high front axle weights this becomes a serious problem. Most drivers of heavy vehicles learn to drive by maintaining light hand pressure on the steering wheel rim, for a firm grip is inviting serious injury. This is particularly important in off-highway work, where many accidents involving broken or sprained hands occur. Some drivers, in fact, cultivate a "thumbs up" attitude, for the sudden striking of an obstruction may cause the front wheels to swing violently against their stops, also rapidly whirling the steering wheel, whose spokes can easily dislocate or break thumbs.

Steering wheels have been known to burst from the sudden acceleration they thus receive, and it is a common matter to have the axle stops hammered over by repeated whips of the front wheels. In one case, this phe-


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nomenon resulted in the unusual complaint by drivers that their steering wheels had become square. These were four-spoke wheels, and because of repeated high decelerations, as the spinning wheel was brought to rest by the front wheels striking their stops, the spokes had become bent, resulting in a "square" wheel.

(EDITOR'S NOTE: The foregoing has been abstracted from a very lengthy paper on power steering problems, presented by the author at the recent SAE Annual Meeting. This abstract includes but a very small portion of the paper, and comparatively few of the many illustrations and drawings which accompanied it.—*H. C. F.*)

## Body Maintenance is Easy

(*Continued from page* 74)

headlight and the bumper, remove the headlight to gain access from above and jack up front wheels, turning the wheels towards the outside, to gain access from underneath. If the dent is on the side below the ventilator, work through the ventilator. You should have little trouble in eliminating the usual dents in front quarter panels and no problem in gaining access to them.

Should the upright corner brace underneath the panel hinder the reshaping of the rounded corner, the brace can be cut at the bottom with a torch and then bent back out of the way. After reshaping the panel, bend the brace back into proper position and weld at bottom. Dents in the upper half of the front quarter panel present no problem of access and are easily removed. However, it is sometimes advisable to remove the glass above this panel, so that one man can hold the dolly block with one hand and hammer with the other hand.

REPLACING FRONT QUARTER PANEL:—If the front quarter panel is damaged beyond repair, the procedure is as follows: Remove bumper and grille panel for access. Grind off welds at front door post; also welds to front bumper channel at bottom. Break loose spot-welding next to the radiator grille panel with cold-chisel. Insert sharp-edged spoon under moulding near grille frame and tap gently, to loosen spot-welding of moulding. Next break welding at bottom of panel at door-post with cold-chisel, also chiseling welds loose where panel joins corner support. Then grind old welds off bumper channel to make it flush and be sure that all other welds you have loosened are smoothed off.

The next step is to place the new panel into position, blocking and clamping it at bottom and at door-post, making sure to retain a 31-inch dimension for radiator-grille panel, top and bottom. It is essential to check this before doing any welding and to recheck it after tightening clamps. Then drill 1/16" or 1/8" holes (according to size of screws available) through outer moulding and new panel, insert screws and tighten until moulding is drawn snug to new panel. Next drill 3/8" holes in *outer moulding only*, every three inches, to provide access for welding moulding to new panel. After welding, grind off screw heads, fill all holes with solder and grind flush. Now weld every three inches up the post and across the top of post, and grind off. Also weld at bottom of post, at bumper channel. This completes the job.

REPAIRING SIDE PANELS:—Dents in side panels above the floor level can be gotten at from the inside by removing the inner lining of the side panels and then using hammer and dolly block. In the event of a severe accident, replacement of the entire side panel may be necessary, and in


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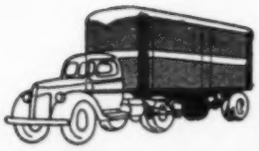

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this case the procedure outlined later in this article should be followed.

REMOVING DENTS IN SKIRT AREA:—Dents that occur in the skirt area, below the floor level, can easily be removed by the following method: Since the outer panels are welded at the bottom to the plaform skirt, if a side or rear panel is dented below the floor level, you cannot gain access to it from within the truck body. However, there is a space between the outer panel and the platform skirt, which affords a means of getting at the damaged area of the outer panel, as follows:

Punch a half-inch hole in the bottom flange of the platform skirt. Through this opening insert a body hook, applying necessary pressure and tapping out the dented areas. On the outside of the panel a bar can be welded to the dented area and used to draw it out, but the use of the body hook is usually sufficient, together with a dolly block held on the outside. It is, of course, necessary to seal up any hole you may have punched or drilled in the skirt flange, after your repair is completed; otherwise moisture will gain access and rust will set in and it may not be noticed.

REPAIRING ROOF DAMAGE: — Most ordinary roof damage comprises dents, and in most cases there is no need for resorting to the use of an acetylene torch. Roof damage is generally caused by contact with low, overhanging branches of trees, or by striking an overhanging pole when driving too close to the curb of a sharp-crowned road. Access to the different roof areas can be had by removing the lining over the driver's compartment, the lining over the load space, or through the package compartment. On most roof damage, however, it is not necessary to work from the inside. Usually a bar is welded to the low point on the outside, the dent drawn out, the bar cut off and then ground off flush and finished in the usual manner.

The roof is composed of three main sections welded together. The flanges between these sections can be seen by removing the roof liners. Should it be necessary to replace one of these sections, or the entire roof assembly, such parts, sections, cross-bars, etc., are readily available.

REPAIRS TO OVERHEAD DOOR:—To gain access to the overhead door balancer, remove the eight screws that hold the header in place; then pull the header down. Examine the hook at the top of the door; if it is broken, weld it together again. Examine the balancer; if broken remove the two screws that hold it in place and put in a new balancer.

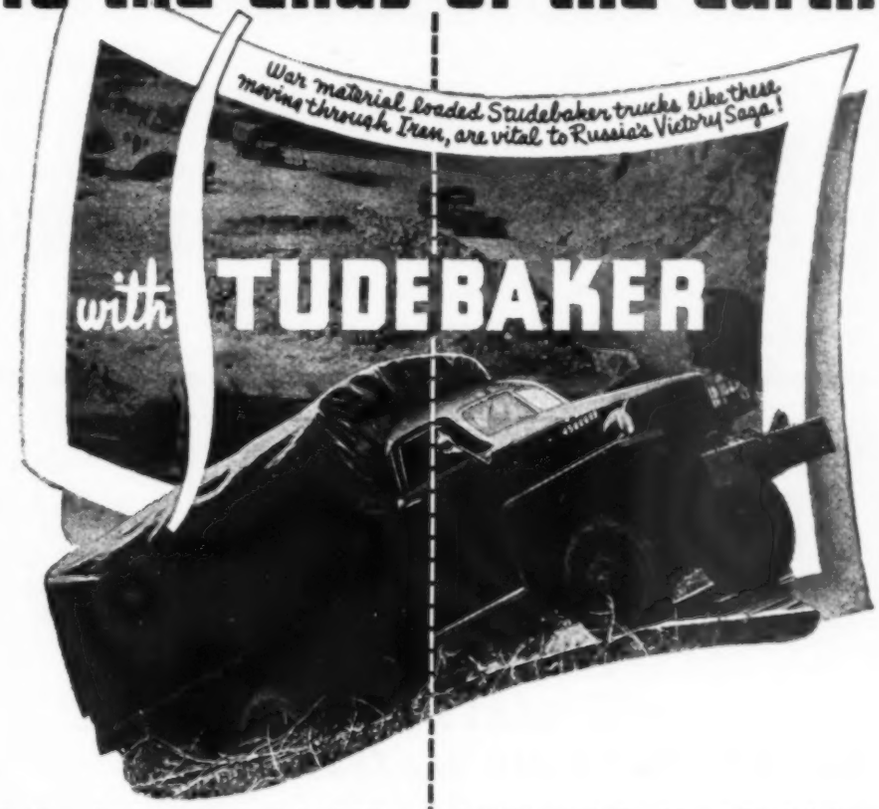
If the door rubs, examine the liner of the door, to see if it is pressing against the outer housing of the door. If so, insert a wire through the intersection of stiffener braces in center panel and pull downward until the proper clearance is gained.

If door and track are damaged in an accident and it is advisable to install a new door and track, proceed as follows: Remove all screws (six on each side) from door channels or tracks. Remove the brackets fastening the door assembly to the roof; 3 screws on each side. After bending the inner side of the rear door channel to free the door, lay the door on its side in the body and then remove it from the body.

The new door is installed in the same manner; place it on its side in the body and then lift it into position. To hold it in position while you are

(*Please turn to page* 130)

To the ends of the Earth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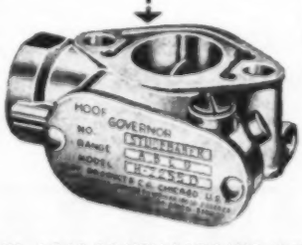


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## Multiple Engines for Post-War Trucks?

MULTIPLE power-plants were recommended before the 1945 Annual Meeting of the Society of Automotive Engineers, held in Detroit recently, as definitely advantageous for use in future motor trucks and buses. Speakers addressing the Transportation & Maintenance Sessions said that equipping commercial vehicles with multi-engines reduces initial cost, improves performance, increases earning power, and enhances operating reliability.

It is now possible to equip with dual engines producing more than 300 horsepower, a motor coach which will be much larger than the majority of present 175-horsepower vehicles, it was reported by President F. R. Fageol, of Twin Coach Co., Kent, Ohio. Higher horsepower and better acceleration and performance are essential, if motor coach operators are to hold present business and develop new, Mr. Fageol said, pointing out that otherwise the motor bus may become a menace to traffic in highly-congested areas and on long grades.

Buses equipped with dual engines are relatively as agile as passenger-cars, Mr. Fageol indicated, and are needed to keep pace with the fast tempo of future highway travel. He explained that two small engines better satisfy limited space accommodations, and permit lightening of the whole vehicle structure.

Ralph M. Werner, of United Parcel Service, New York, estimated savings of as much as 50 per cent in power-plant costs when using two small engines, cited substantial weight savings, and said that the difficulties arising from failures along the road could be almost completely eliminated.

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Mr. Somes said that induction heating machines occupy little space, are fully automatic, afford precise control both of heating and quenching, and assure 100 per cent automatic inspection of results. Defects in parts, creating abnormal resistance to the flow of high-tension current, produce excessive temperatures and other physical signs of difficulty, he added, making inspection virtually automatic also.

Mr. Somes said that induction heating produces superior structures and makes the machinability of cast-iron actually greater than that of hardened steel.


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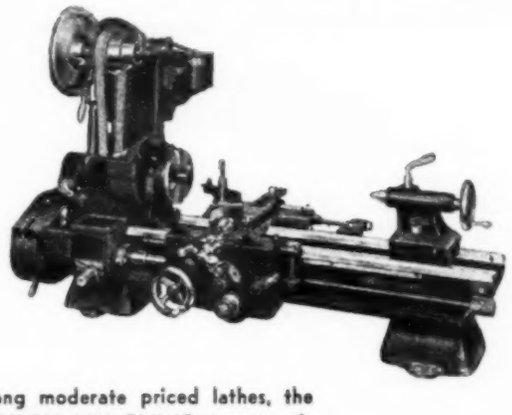

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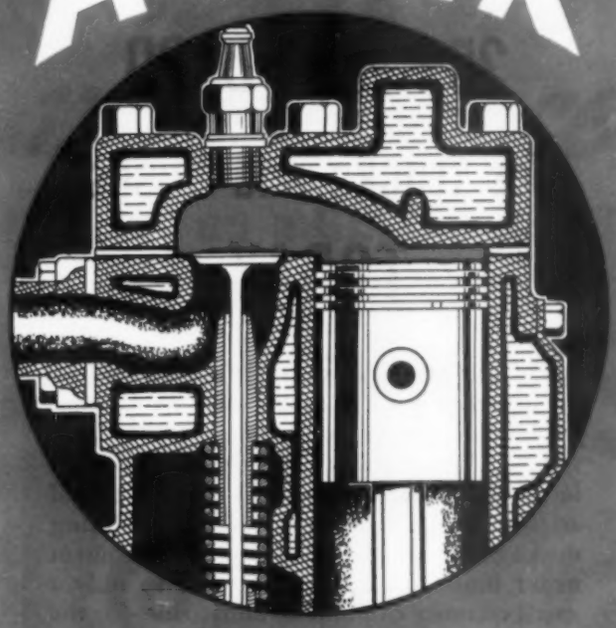

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## Immersion-Heaters Make Cold Starting Easy

THE application of electric immersion-heaters to the water-jackets of motor vehicle engines, to expedite starting in cold weather, was recommended before the 1945 Annual Meeting of the SAE., at the T & M Sessions, recently held in Detroit.

E. P. Gohn, of the Automotive Transportation Dept., The Atlantic Refining Co., Philadelphia, Pa., reported the results of experiments with commercial vehicles as showing that application of immersion-heaters reduces engine starting time to seconds and appears helpfully to raise the temperature of crankcase oil, bearings, and parts to degrees which assure quicker warm-up, better lubrication, and reduced maintenance costs.

Mr. Gohn said this quick-starting method merits post-war thinking, and advocated that engines be designed for heater installations, to take advantage of what appears to be a relatively simple and economical means of quick-starting the engines of automotive equipment that must be stored outdoors or in unheated garages.

It was reported that two electric immersion-heaters with total 1,250-watt capacity, raised block temperatures to 44 degrees Fahrenheit, making 20-second starts possible in zero weather. When block temperatures were increased to 53-54 degrees, starting time was reduced to 6.5 seconds. Mr. Gohn indicated that in temperatures of 17 degrees below zero, it is possible to start engines if the jacket temperatures be raised to around 57 degrees and warm, fully-charged batteries are used.

Minor differences in water-jacket temperatures were said to have major effects on starting ease. At


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zero, heating the liquid in the water-jacket to 44 degrees, produced an easy start in 21 seconds. If the jacket liquid was heated only to 36 degrees, however, starting required 66 seconds, or three times as long.

●

## Post-War Cars, Trucks May be More Decorative

POST-WAR motor vehicles made highly decorative by the use of new synthetic materials for upholstery, trim and finishes, were reported as possibilities before the 1945 Annual Meeting of the Society of Automotive Engineers, recently held.

Morris Sanders, industrial consultant and architect, of New York, suggested the coming of plaid-surfaced station wagons, of florists' trucks resplendent in floral designs, and of decorative industrial patterns on other commercial vehicles. He described motor buses with ceilings opaque by day, translucent by night, and passenger-cars with convertible tops as translucent as a woman's rain-coat, but much more enduring.

Mr. Sanders said that synthetic materials actually invite interior decoration of motor vehicles, and promise fabric-based rigid laminates for vehicle bodies, more enduring and decorative than anything before available. He told the Materials Session that the new synthetics are getting maximum tests in warplanes, and already promise to provide both upholstery which is bright in appearance, resistant to wear, and easy to clean; and single and multiple-laminates for exteriors, capable of being post-formed for angled, corrugated, or curved surfacings. Among the synthetics he mentioned vinylidence chloride, sheet vinyl, cellulose acetate, fiberglass, rayon, and nylon.


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## Body Maintenance is Easy

(*Continued from page* 125)

checking up, fastening the tracks, etc., you can use a T-shaped brace made of 2" x 4" wood. Including the top piece, this support should be about 64 inches high. Replace the rear rubbers if necessary. Next screw the new tracks into position, and check same for clearance, which should be 34 inches. A piece of light-gauge channel iron ⅜ by 1½ inches wide or a yard-stick cut exactly 34 inches long, will be helpful in checking this clearance efficiently. If there is excessive clearance, shim the track to eliminate it. Before replacing the front fastenings, check the door repeatedly, to be sure that it is working properly.

Side doors and rear overhead doors that do not work easily can often be restored to perfect operating condition by the simple expedient of cleaning the tracks and applying a little graphite. By keeping your door tracks clean and lubricated, and your doors free from dents, which alter their alignment, you can save much "door trouble" and it would be well to check these points before deciding to make "repairs" on a door that seems out of order. Clean and well lubricated doors will open and close without having to slam them.

REPLACING SIDE PANELS:—In the event of a severe crack-up, replacement of the entire side panel may become necessary; here is how the job should be done: Using a screw-driver, pry loose the vertical moulding between side and rear panels, and remove the back strip which is held in place with metal screws. Next the inside lining of the body is removed (by removing screws) and this should be stood up against the wall to prevent bending. With a cold-chisel, a piece can be cut out of the lower rear corner of the outer panel in order to get at the five bolts, which are next removed. Since the side panel is arc-welded at the seam to the rear quarter panel, the weld should be ground and broken off, working on the panel to be removed, so as to avoid any damage to the rear quarter panel.

After this, all the bolts between the side panel and the rear quarter panel can be removed, right up to the roof. Again, using the chisel, cut off the rub rail along the bottom of the panel and grind along the edge of the rear wheel arch until ground through. Next unbolt the two hold-down brackets at bottom of front door recess well, remove center moulding on panel by unbolting, chisel loose the weld of the upright post on the wheel-housing, remove machine screws at top of side panel, grind off the five arc-welds and the side panel can be cut loose from the roof, along the top of the frame. By removing two studs at the lower front door post and taking the metal screws out of top of post (holding post to roof panel) then removing the post, the sliding door can be moved ahead. The sliding door can next be lifted out by removing the six metal screws holding the door to track, tilting up the track and removing same and removing door guide at bottom.

Next remove the three screws in top of panel frame over doorway, cut the weld with chisel at top of front door post, leaving the channel with it. The old panel is about ready to be lifted out. This can be facilitated by inserting a body spoon between the frame cross-member and the roof, just behind the channel, and by bending the top frame piece down at a 45-degree angle.

In getting ready to install the re-

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placement panel (which really includes the entire side frame and outer panel as a unit), be sure to grind all welds which you have broken loose, so that the new panel will fit absolutely snug against the rest of the body. After placing the new panel into position, clamp in place and check all seams, especially the doorway. Next mark the location of the bolt holes on the side of the roof liner, and drill corresponding holes in the new panel so that they line up with the old holes in the roof flange.

To replace the bolts at the rear of the side panel, pry the rear quarter panel back about 2½ inches, insert a block or wedge, and the bolts can be put in hand-tight and later tightened up. In fastening to the wheel archway, use three clamps with a block of wood on each, and with the body spoon, work the new side panel into the same plane as the rear quarter panel.

Next, from the inside of the body, run your drill through all flange holes along the rear quarter panel, insert bolts, using a flat washer on each side, and leave hand-tight for the time being. Next is the final tightening of all bolts through panel to roof top, using two spreaders—one front and one rear—to hold the panel up against the roof, tight against the drip moulding.

After this comes the welds which you have broken. These should be rewelded, using arc-welding if available, welding the panel frame to the roof liner. If using gas welding, watch the flame on the side panel, so as not to overdo it. After tightening up the rear quarter bolts, using a body spoon to line up the side panel with the rear quarter panel, you are ready to weld the rear quarter panel to the side panel. The welds should be 6 or 7 inches apart, starting from the rub-rail at the bottom and continuing up to the floor level.

The flange at the bottom of the rub-rail should be clamped to the inside of the platform and the skirt should then be welded to the flange of the rub-rail. Next, weld the top channel to the front post, tighten one bolt of the front door well and install the track at the bottom. After this you can replace the door and slide it back into position. Next, drop No. 1 post back into the platform socket and replace the bolt hand-tight. Now replace the seven bolts attaching the front door channel to the door, leaving the bolts loose. Block up the bottom of the door for clearance; then tighten.

After welding the frame to the wheel-housing at bottom of post (over wheel-housing) you can then tighten *all* bolts and screws for the final tightening, and your job is finished. The inside lining can be replaced just as you took it out, to complete the operation.

REPLACING REAR QUARTER PANELS:—The rear assembly also includes the license-plate section. To remove the rear quarter panels, it is necessary to first remove the liners of the side panels (as previously explained), also the liners of the rear quarter panels. (Of course, if only one rear quarter panel is to be replaced, only the liner on that side must be removed.) Next, from inside the body, remove all bolts between rear quarter panel and side panel, as previously explained.

Next take off the vertical moulding between rear quarter and side panels, chiseling the welds loose. The top seam of each rear quarter panel is approximately 63 inches above the bottom of the panel. It is important to avoid damaging any part of the

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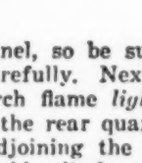

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roof panel, so be sure to locate the seam carefully. Next apply an acetylene torch flame *lightly* on the outside of the rear quarter panel at top seam adjoining the roof panel; this will quickly disclose the seam.

Next, chisel across the rear quarter panel about ¼" below the top seam, and after the rear quarter panel is cut, the remaining ¼" can be ground off, without damage to the roof panel. The rear door posts are welded at the top to the rear roof panel; grind these welds first and then break them with a chisel. By removing two nuts each (four altogether) at the bottom of the door posts, from underneath and below the floor level, the rear quarter panel can then be removed from the body.

Next, make sure that all old welds are ground smooth and that any remaining portions of the old quarter panel are cleared away. Since the license-plate section is welded at the sides to the rear quarter panels, it can be removed with the rear quarter panels or the welds can be broken with a chisel and it can be removed separately. (If the body you are working with is equipped with the overhead door, the door-check plate must be removed by unscrewing, before removing the license-plate section.)

Now we are ready to install the new rear quarter panel. Place it in correct position and clamp in place. Set the license-plate section in position and clamp in place. Next, check the alignment all around. When you have it correct, reverse the process, bolting and welding where you have unbolted parts or broken welds. When all bolting and welding is completed, fill the horizontal seam across the top of the rear quarter panel with body solder and finish it off. Then replace the vertical moulding and fill in at top with solder up to drip moulding.

REPLACING FRONT WINDOW PANEL: This panel is gas-welded and soldered where it adjoins the windshield panel. First remove lining, also glass, if broken, and apply torch lightly, to loosen solder and expose the joint. Then break the weld loose, using a body spoon; also break weld at door-post by grinding and the weld at the bottom (moulding) with body spoon. Should the door-post be seriously damaged cut out that section and weld in a new piece, rather than replace the entire door-post. Then grind off any excess metal of old welds.

We are now ready to insert the new panel into position and clamp it to the door-post. The resulting windshield opening should now be checked, to be sure that the new panel is correctly placed, using the windshield pattern or template referred to early in this article. Next, spot-weld at post, gas-weld to windshield panel and fill with solder, also spot-welding at moulding to lower part of front quarter panel. The window glass can be inserted, as explained previously, using twine to draw the rubber channel in place over the flange of the opening.

REPLACING WINDSHIELD CENTER-POST:—If a new windshield center-post is needed, the old one should be removed as follows: First remove window glass and wiper tubing, then apply a torch *lightly* at bottom to disclose exact joint. Next break weld at bottom with cold-chisel and pull out center-post at bottom. Apply torch *lightly* at top to disclose exact joint and then break weld with chisel and remove post, smoothing off joints by eliminating old solder.

The new post is inserted, top first and bottom last. Clamp lightly into

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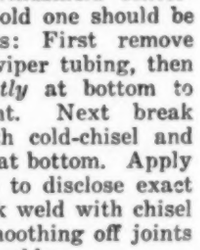


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position and check on window opening again, and then weld at top and bottom. Grind off and smooth everything. Set window glass, as explained previously, and your job is complete.

After making any of the above repairs, or at any other time that the truck is being refinished, instruct your painter to spray the under-side of the wheel-housings and the front quarter panels, since these areas are constantly subjected to moisture, sand, gravel and even skid-chain contacts, and such paint protection will prevent rust and corrosion, and greatly extend the life of the body.

•

## More About Water Injection

(*Continued from page* 94)

alcohol provides a fatter indicator diagram. This is further demonstrated when the 100 percent alcohol curves are compared with those for plain water injection; in this case, the gain in torque for alcohol over water is 19 foot-pounds or 7.7 percent.

This figure presents another interesting comparison, showing how much the power of this engine can be increased when 100 percent alcohol is injected as an internal coolant. The torque gain is 30.5 foot-pounds or 13 percent. It will be noted, however, that the brake thermal efficiency when using alcohol is one percentage point lower than when no alcohol is used. We must remember that the fuel used is considerably below the engine requirement in octane value.

*Figure 3* shows what can be accomplished by alcohol-water injection in increasing engine power and efficiency. A truck engine of 318 cu. in. displacement was used and tests were conducted with two compression ratios—6.45:1 and 7.25:1, using gasoline of 79.5 octane rating. This fuel was selected because the concensus of post-war prognostication points towards octane numbers of approximately this value.

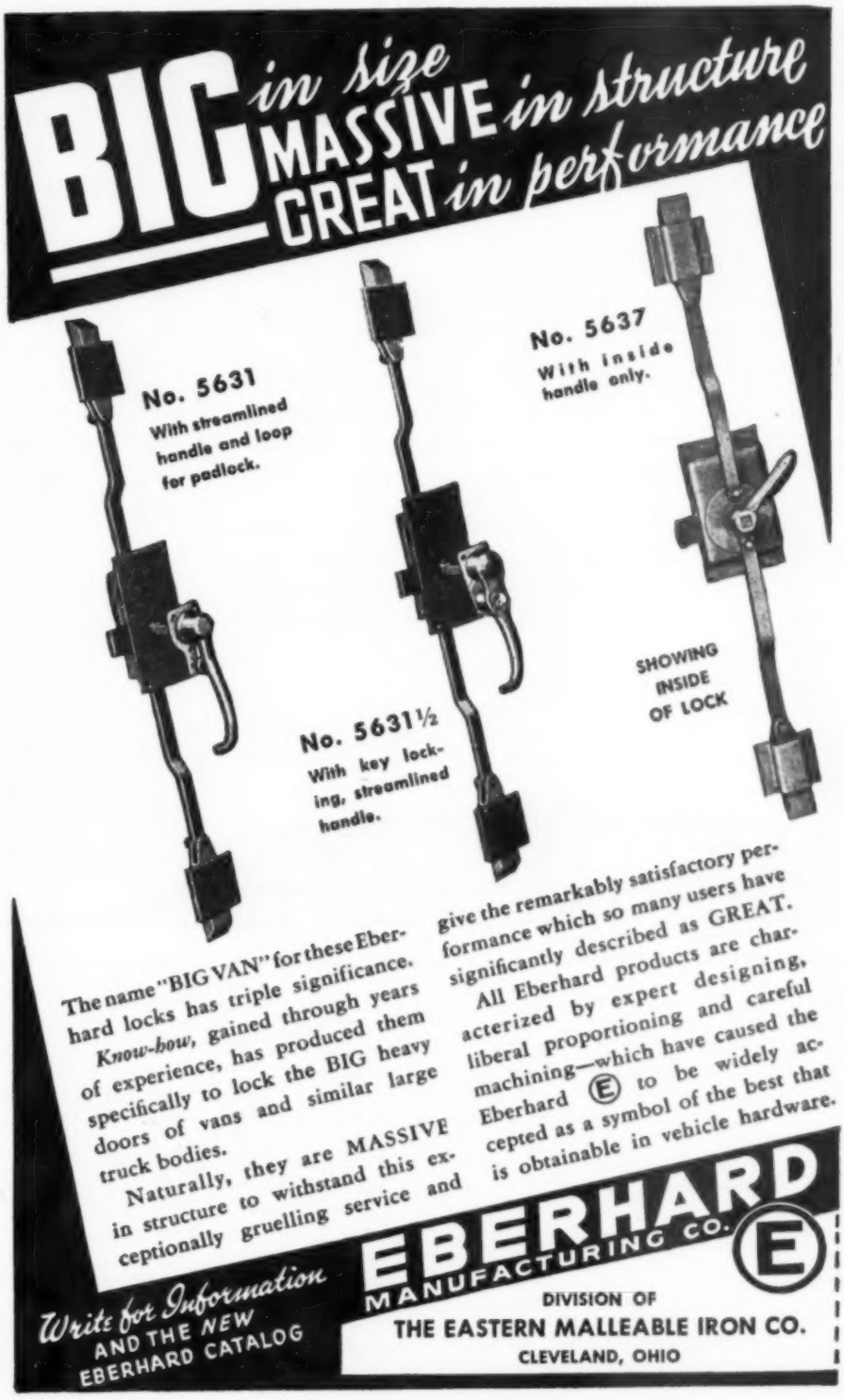
The full-line curves designate the best performance of the low compression ratio. The dotted lines cover the high-compression head performance, using alcohol-water injection and a lean carburetor setting.

Alcohol-water injection increased the maximum torque from 254 to 265 foot-pounds. The brake thermal efficiency was improved about two percentage points, from 25.15 to 27.25 percent.

The spark advance required with alcohol-water injection was higher at the low speed, indicating a lower rate of pressure rise. The amount of anti-detonant required was 25.5 percent at 800 r.p.m. decreasing to 16 percent at 2,800 rpm. This comparison indicates that alcohol-water injection will be of interest with higher-octane fuel, particularly with higher compression ratios.

A fourth test (not illustrated) showed how the injection of alcohol alone would improve performance characteristics, when a truck engine with a relatively high compression ratio was operated on low-octane fuel. Additional tests, along the line, seemed to definitely "state the case" for the use of alcohol-water injection as an anti-detonant. (Sorry that we do not have room to show them all.—Ed.)

ENGINE WEAR, CORROSION AND CLEANLINESS:—There have been numerous references and statements to the effect that when internal cooling is used, combustion-chamber deposits are either eliminated entirely or greatly reduced. Engineers of Thompson Products ran a number of tests in their laboratory, in an en-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deavor to obtain information on this subject.

One test consisted of a cycling routine simulating the conditions of light-truck service. A V-8 engine was selected so that half of the cylinders could be fed an alcohol-water mixture. 600 hours of operation, covering the equivalent of 14,250 miles, were run. The engine jacket cooling water was at all times between 100° and 130° F. Low temperatures were purposely maintained to accelerate engine-bore wear.

The average weight of engine deposits for each group of cylinders was about the same but varied considerably between cylinders of the same group. Chemical analysis of the deposits showed the results to be inconsistent. However, the deposit from the alcohol-water-fed cylinders was of a softer, flakier nature and was easily dislodged.

Cylinder-bore and ring measurements made before, during and after the test, showed the difference in wear between the two groups of cylinders was negligible.

To obtain more information on this subject, another test was conducted with the same equipment reported above. This test consisted of full power operation at 2,000 rpm with maximum injection of alcohol-water in half of the cylinders, with spark set for borderline detonation for 100 hours. The jacket water was held at 160° F.

The average engine wear was normal for each group of cylinders. Engine deposits were from all outward appearances about the same in quantity and color. However, the deposits in the alcohol-water-fed cylinders were easier to scrape off. Reports from aircraft-engine manufacturers checked our results that the amount of deposit with anti-detonant injection is about the same, but that the deposits are softer and more easily removed. They also report no difference in wear.

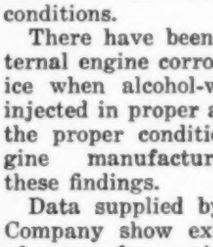
Numerous observations on road tests have brought out the fact that an alcohol-water-injected engine will not detonate immediately after the injection is shut off, and one aircraft manufacturer substantiates this point. Detonation, however, does re-occur shortly, necessitating a distributor adjustment to retard the spark if the alcohol-water injection is not turned on again. This is an indication that the deposits are affected in such a way, perhaps, as to render them temporarily impotent in promoting detonation. This phenomenon may be due to the fact that the deposits lose some of their insulating qualities.

The apparent discrepancy between our findings and some of the published articles in regard to engine cleanliness is probably due to differences in the fuels and operating conditions.

There have been no reports of internal engine corrosion in truck service when alcohol-water or water is injected in proper amounts and under the proper conditions. Aircraft engine manufacturers substantiate these findings.

Data supplied by Sterling Engine Company show extremely low rates of wear for engines operated continuously on natural gas, even though large quantities of moisture were present in the raw fuel and as products of combustion. Tests extended over 50,000 hours of operation.

It is felt that sufficient data are now available effectively to "lay the ghost" of internal engine corrosion caused by the injection of alcohol-

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water blend with the fuel. This can be explained as follows:

(1) The fluids should be added only during periods of high metal temperatures, when the formation of corrosive acids is at a minimum.

(2) Large quantities of water are already present in the form of vapor as a normal product of combustion—1 gallon per gallon of fuel.

(3) Only minute quantities of anti-detonant are used per cycle—approximately 1/3 cc per minute per cubic inch displacement at maximum conditions, or .021 cc per cycle for a 50-cubic-inch cylinder at 1,600 rpm.

COST ANALYSIS:—There are many variables in computing the cost of alcohol-water injection. Here we shall endeavor to cover the cost of alcohol-water injection so that the economics of such injection can be analyzed in the light of individual requirements when known quantities and cost are considered together with specific operating conditions.

The cost per gallon of gasoline used was arbitrarily taken at 20 cents for the 79.5-octane gasoline and 17 cents for the 69.8 gasoline. The curve shown in Figure 4 represents a typical analysis comparing the cost of operating a vehicle requiring 79.5-octane fuel (20¢ per gallon) against 69.5-octane fuel (17¢ per gallon), using water-alcohol injection. Since water-alcohol injection is used only part of the time, the horizontal scale indicates the percent time at full load (balance at road load). The vertical scale shows the allowable cost per gallon of alcohol for equal fuel cost. Thus an operator knowing his own type of service can figure the savings or loss by comparing the actual and allowable alcohol costs. For instance:

| *Time at Full Throttle %* | *Allowable Cost per Gallon Alcohol* |
|---|---|
| 10 | $2.00 |
| 40 | .74 |
| 70 | .56 |
| 100 | .50 |

The influence of the type of operation on the fuel cost is shown. The smaller the per cent of time the vehicle is being operated at full throttle, the more can be paid for alcohol without increasing total fuel cost.

It must be remembered that during the time when part throttle is being used, a lower-cost gasoline is consumed than would be the case if an internal coolant were not used.

There is another important factor in figuring fuel costs. It is a common practice to retard the spark to eliminate full-power detonation. When this is done, the part-throttle spark is automatically retarded, thereby adversely affecting the economy of operation. By the use of an internal coolant the most efficient spark position can be maintained.

SUMMARY:—Many questions regarding anti-detonant injection remain unanswered at this time. It offers a field for much greater research, as the surface has barely been scratched. The following conclusions, however, may be offered at this time:

1. Its performance in supercharged aircraft engines in this war has been remarkable.

2. The control of pressure rise and shock may facilitate the design of higher-compression engines with minimum weight.

3. 50-50 alcohol-water injection appears to be the most economical fluid for best results. The alcohol content used may be a blend of various alcohols for denaturing purposes and to gain the best properties of each type.


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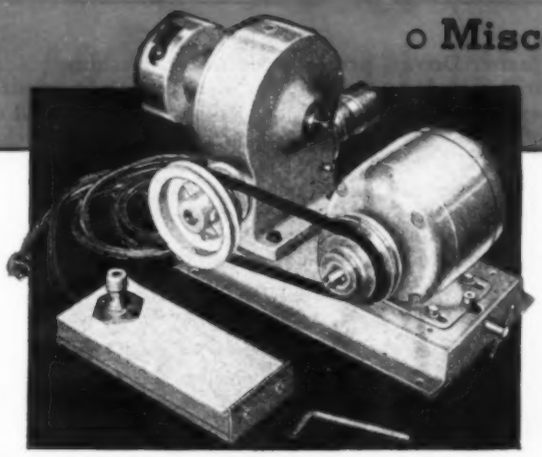
- Miscellaneous Polishing



K-O Reamer Drives are made with either 20 to 1 or 40 to 1 gear ratios. Standard equipment includes a 5" Universal Chuck and a ⅝" Drill Chuck.

***Knock-Out* Reamer Drives are equipped with hand and foot switches enabling the operator to hold his work in both hands, giving him absolute control of the job. This machine will prove to be one of the greatest labor and time saving units in your shop. Perhaps you've long wanted one to make your equipment complete . . . now you can have one!**

| SPEEDS | 5" Universal Chuck 40 to 1 Gear Ratio (Model D300S) | 5" Universal Chuck 20 to 1 Gear Ratio (Model D300D) | ⅝" Drill Chuck (For both Models D300S and D300D) |
|---|---|---|---|
| Slow | 20 RPM | 40 RPM | 680 RPM |
| Medium | 36 RPM | 72 RPM | 1300 RPM |
| Fast | 60 RPM | 120 RPM | 2000 RPM |

Write for bulletin No. 2A-25

K. O. LEE CO.
ABERDEEN, SO. DAK.

# Little Known facts of a well-known product

The wide usage of Bendix Starter Drive in over 65 million installations is due in no small degree to the excellence of design and workmanship of each of its component parts.

That vital part, the Anti-Drift Spring, for example—made of the finest quality wire—holds the starter pinion away from the flywheel when not in use and thus prevents unintended meshing.

For quick identification and your protection, the Anti-Drift Spring and other Bendix Starter Drive parts are packed in the well-known blue and white Bendix boxes.

Remember—the name Bendix is your assurance of durable construction and customer satisfaction.

BENDIX AND ECLIPSE ARE TRADE-MARKS OF BENDIX AVIATION CORPORATION

# Bendix Drive

ECLIPSE MACHINE DIVISION

BENDIX AVIATION CORPORATION, ELMIRA, NEW YORK


Some alcohols are most effective for preventing detonation, others for preignition.

4. A great field of use may be in light aircraft engines. These engines operate at full load only a small portion of the time and will likely be designed to operate on fuel for ground vehicles after the war. Alcohol-water injection will be particularly valuable for this type of operation.

5. It will be particularly effective if supercharging is used on ground vehicles, an important point being that it enables the engine to consume more air at the same engine speed.

6. There have been a great many reports of engines operating cleaner with alcohol-water injection. We believe that results will vary with different fuels, engines and operating conditions. In every case where alcohol-water injection was used, deposits have been reported softer and easily removed.

7. When injected properly and in correct amounts, there is no additional corrosion with alcohol-water injection.

8. To our knowledge, there have been no reports of alkali deposits in the engine when alcohol-water injection was used.

9. It is probable that the beneficial effects of alcohol-water injection are due both to cooling and to chemical action.

10. Best gains are realized when fuel of approximately 12 octane numbers lower than the engine requirement is used.

11. Commercial alcohol is miscible with water but not with gasoline unless a binder is used; hence injection is the most practical way of using alcohol.

12. Incorporating the device in a carburetor will eliminate an additional accessory. We believe this can be done.

13. The economy effected by the use of lower-grade fuel with alcohol-water injection will promote its use for many operations.

14. It is realized that the use of alcohol-water injection has the disadvantage of an additional fuel system and the necessity for replenishing the supply. However, the advantages will outweigh the disadvantages for many types of operation.

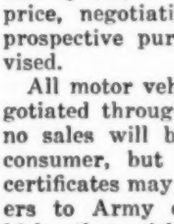
●

## SURPLUS PROPERTY DISPOSAL

● Streamlining of the program for the disposal of surplus property held by the Federal Government, including motor vehicles and tires, recently was announced by the Treasury Department's Office of Surplus Property.

Under the new procedure a "Surplus Reporter" will be issued from each of the eleven regional offices of the Treasury's Procurement Division listing surplus property for sale, the area in which it is located and the general sales method. Prospective purchasers will then contact the regional office and indicate their interest. The Office of Surplus Property will then furnish forms in cases of sale by bid, or if sale will be fixed by price, negotiation or otherwise, the prospective purchaser will be so advised.

All motor vehicle sales must be negotiated through regular dealers and no sales will be made direct to the consumer, but holders of eligibility certificates may accompany their dealers to Army camps to inspect vehicles they wish to purchase.

The cost and time required to install a genuine Timken Bearing are exactly the same as any tapered roller bearing.

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CANTON, OHIO

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GATKE *Custom-Bilt*
BRAKE BLOCKS
ASK YOUR GATKE JOBBER
GATKE CORPORATION 228 N. LaSalle CHICAGO

## TOTAL TRUCK PRODUCTION

• More and more statistics on truck production continue to emanate from WPB offices. This time they give you *total* projected truck production scheduled for 1945, and subject to change, of course, at any time without notice.

This year's civilian *and* military requirements for trucks, says WPB, will be even greater than 1944 total production, according to information presented to WPB's new Heavy Truck Labor Advisory Committee by WPB and armed forces officials. . . . Tentative schedules for 1945 call for the production of 869,212 trucks of all types in 1945, as contrasted with the 743,750 (excluding half-tracks and armored cars) produced in 1944.

The following breakdown of military and civilian truck production was given to the Committee last month, with a warning that schedules for 1945 are still subject to further increases:

| Military and Non-Military | 1944 Actual | 1945 Schedule |
|---|---|---|
| Light Trucks ..... | 247,113 | 296,985 |
| Medium Trucks ... | 175,370 | 184,436 |
| Light-Heavy ..... | 256,185 | 322,734 |
| Heavy-Heavy ..... | 65,082 | 65,057 |
| Total All Sizes.. | 743,750 | 869,212 |

H. G. Batcheller, WPB Chief of Operations, informed the Committee that, in order to clarify production needs and problems in particular regions of the country, WPB is now compiling monthly reports on production of trucks and other critical war materials.

Other WPB officials praised the efforts of labor and management in truck and truck component plants during 1944. They emphasized that in December the number of light-heavy trucks produced was 2,000 above the annual peacetime output, and the number of heavy-heavy trucks was 400 above the annual peacetime average. However, WPB officials stressed that even greater levels of output must be achieved in 1945, because of the increased tempo of military operations.

Members of the labor advisory committee joined with WPB officials in agreement that truck production can be increased through regular consultation with other labor advisory committees concerned with output of automotive vehicles. . . . The committee expressed the following views on factors affecting maximum output of heavy-heavy trucks:

1. No manpower shortage exists in the truck assembly plants. This generalization does not include the special case of foundries and forge shops, which produce basic component parts for trucks. A severe manpower shortage exists in many foundries, especially in the case of unskilled workers.

2. Among obstacles interfering with heavy truck production are layoffs, temporary shutdowns and poor utilization of manpower in some plants, as well as absenteeism.

3. Plants achieving maximum truck production are those in which good relations prevail between management and labor. Where joint labor-management cooperation is possible, the advisory committee members said, labor has been successful in keeping workers on the job and in explaining the need to work overtime and Sundays.

4. Greatest heavy truck output will require these steps, in the opinion of the labor representatives: Full utilization of existing plant facilities; no idle machines in factories in which workers are waiting around for work; use of subcontractors to supplement home plant facilities—not to take

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OLD TYPE PISTON RING
Burd electric furnaces distribute natural graphite evenly; grinding particles are removed; colloidal graphite applied.
See poor distribution of carbon in ordinary cupola-iron rings. Note harmful abrasive particles on ring surface.

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# SEE ADDED *LIFE* IN PISTON RINGS

Now you can SEE why Burd "Graf-Flox" Piston Rings give many extra miles of life . . . why Burd equipped cars and trucks need no run-in (can be driven right from the shop under full load and speed). You can SEE from the independent research laboratory photomicrographs, that Burd electric furnace iron is scientifically controlled to have uniformly distributed natural graphite. You can SEE how an exclusive Burd process completely removes all abrasive metal particles which adhere to ring surfaces after grinding . . . that another special method applies deeply penetrating colloidal graphite. You can actually SEE why Burd "Graf-Flox" Piston Rings seat faster . . . are non-abrasive and do not scuff . . . how they are made self-lubricating to prevent scoring, seizing and sticking in grooves . . . why they add many extra miles to motors.

**THESE 3 TYPES CORRECT VARYING DEGREES OF CYLINDER WEAR**

BURD "Super Hi-Speed" Type Meets extreme conditions of cylinder wear.

BURD "Hi-Speed" Type For cylinders with taper of .003" to .007"

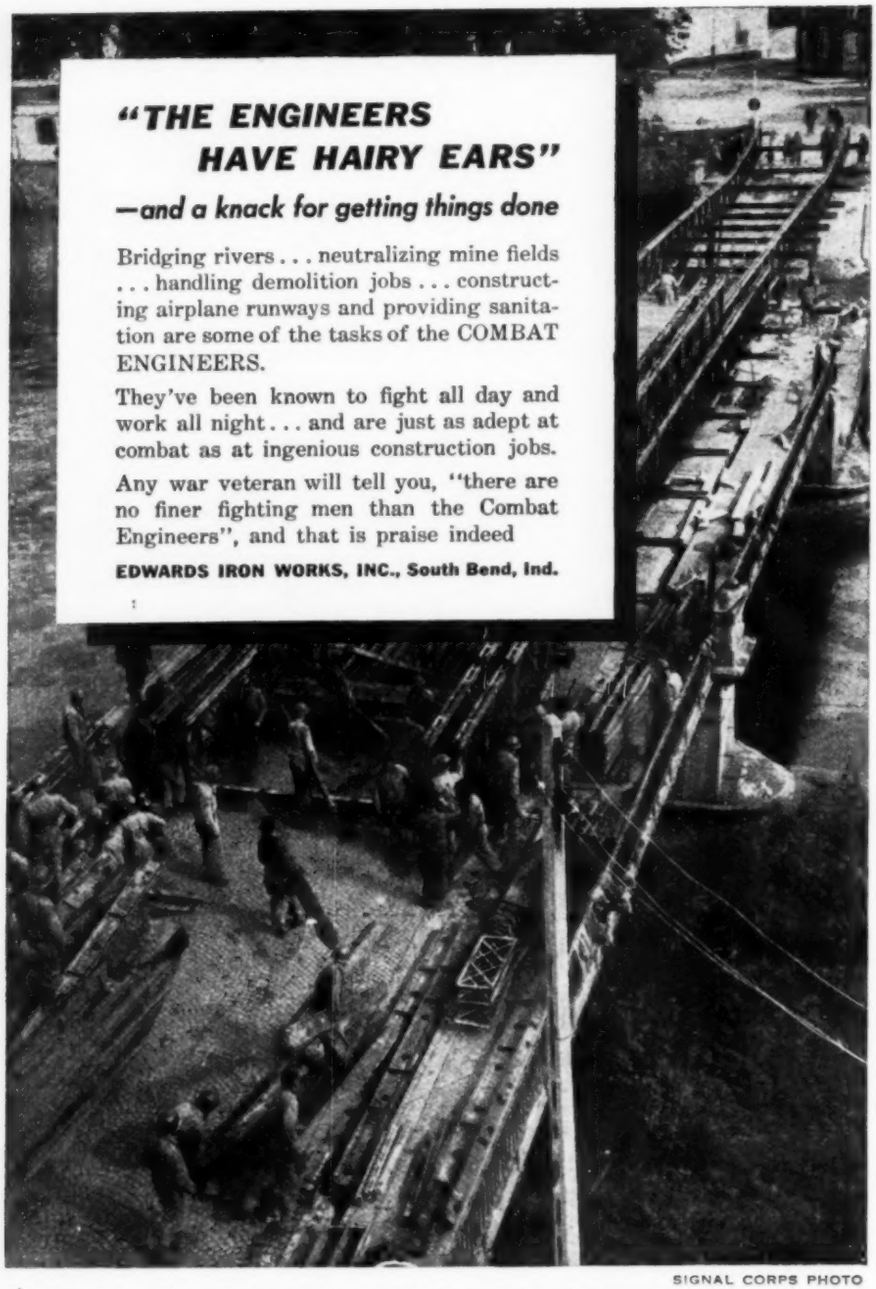
BURD "Quik-Seal" Type For Cylinders under .003" out of true.

"Graf-Flox" BRINGS THESE ADVANTAGES TO BURD PISTON RINGS

★ Quick Seating . . . No Run-in Needed
★ Non-Abrasive . . No Danger of Scuffing
★ Self-Lubricating . . . No Scoring, Seizing
★ Prevents Rings Sticking in Grooves
★ Adds Life to Rings and Motors.

BURD PISTON RING CO., ROCKFORD, ILLINOIS

BURD "Graf-Flox" PISTON RINGS



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**—and a knack for getting things done**

Bridging rivers . . . neutralizing mine fields . . . handling demolition jobs . . . constructing airplane runways and providing sanitation are some of the tasks of the COMBAT ENGINEERS.

They've been known to fight all day and work all night . . . and are just as adept at combat as at ingenious construction jobs.

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their place; a seven-day week must be instituted in critical sections of a plant to insure continuous operations on assembly lines; no usable foundry should lie idle for want of contracts; better planning and early placement of orders with suppliers of component parts; plants that are holding back war production in favor of production for the post-war period must be checked; elimination of re-timing of jobs at the expense of the workers when they speed up production; managements must be urged to shoot at maximum rather than minimum figures; improvements in labor relations in some plants; clear-cut information to workers regarding the schedules that have to be met.

The advisory committee members submitted information to WPB representatives regarding individual plants with which they were familiar. The Government representatives agreed to investigate, to relay the submitted information to the proper agencies, and to take action wherever possible.

WPB officials said they would give consideration to calling meetings of labor representatives from plants making storage batteries, engines and electrical accessories.

## 11-MONTH TRUCK PRODUCTION

● Total production of motor trucks and truck-tractors in the first eleven months of 1944 was 672,712 units. . . . Broken down, this figure represents 103,081 trucks for civilian use and 569,631 units for military use in all sizes. . . . Since there were no light trucks made for civilian use last year, the civilian total of 103,081 units represents 78,423 medium trucks and 24,658 heavy ones. . . . The military figure of 569,631 units includes 226,680 light, 82,054 medium and 260,897 heavy trucks.

Production data on motor trucks and truck tractors for the years 1936 to 1943 inclusive have been revised by weight classification and separated into civilian and military production on the basis of "gross vehicle weight". . . . These figures are now available from the Bureau of Census, Washington, D. C., under the title *"Facts for Industry"* Series.

Previous production figures were assembled on a "rated tonnage capacity" basis. As there was no standardized method employed by the industry in rating tonnage capacity, a large volume of production had been reported in the heavy group, but was shifted to the medium group when reporting on the basis of gross vehicle weight.

These data cover actual production of trucks for military *and* civilian use. They differ from the "factory sales" figures accepted as an index of production before the war. . . . Jeeps, military ambulances and wheel-drive personnel carriers are included; half-tracks and armored cars are excluded. . . . Military classification includes those procured by Army, Navy, Aircraft Resources Control Office, Canada and Treasury for military use. . . . The civilian classification includes those produced for civilian use under WPB Limitation Orders. . . . Production is reported by 37 companies, representing the total industry.

●

## NOT ENOUGH TRAILERS?

● The reduced commercial trailer program for 1945 is insufficient to cover essential commercial transportation requirements, and many operators may be unable to obtain new trailers required for hauling essen-

KRW

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**EQUIPMENT**

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tial war freight, members of the Truck Trailer Manufacturers Industry Advisory Committee told WPB last month.

Authorizations issued September, 1944, called for first-half 1945 production of 11,248 commercial general freight trailers. This amount has been reduced to 9,016 on a revised program determination.

Handling of unfinished production authorized for 1944 was discussed by Government officials. Authorization to complete production not finished in 1944, in cases where manufacturers had all materials and components in inventory, less wheels and tires, specified that such production must be completed prior to February 15, 1945. Trailer production, under this directive, would have no effect upon authorizations covering first-half 1945 commercial trailer program, WPB officials emphasized and that military trailer production and scheduling of critical components must be given precedence over commercial types approved for 1945 manufacture. . . . Increased requirements for large truck and trailer tires used on military vehicles were stressed by an Army representative.

Current release of trailers under rationing regulations of ODT has kept in close balance with actual production of commercial trailers, WPB disclosed.

Procedures followed by WPB regional field offices in checking component requirements of individual manufacturers for the first half 1945 trailer program were also discussed. . . . Industry committeemen expressed satisfaction with the assistance given by WPB field representatives in getting component requirements for trailer production on suppliers' schedules for 1945. Such aid will definitely expedite trailer production, the manufacturers agreed.

•

## CHANGE IN TRUCK RATIONING

Bearing the date of December 27, 1944, Amendment 2 to ODT's Administrative Order No. 27 was announced, with reference to the rationing of new commercial vehicles and pertaining specially to the consideration of applications by ODT District Managers. We quote from the amended Section 503.471:

CONSIDERATION OF APPLICATION BY DISTRICT MANAGER: (a) The district manager to whom an application is submitted may refer the application to another district manager for advice or handling.

(b) Except as hereinafter provided in paragraph (d) of this section, upon receipt of an application the district manager without undue delay shall make any necessary investigation and shall either recommend approval of the application or shall disapprove it. If the district manager recommends approval of the application, he shall forward it to the Highway Transport Department, ODT, Washington 25, D. C. If the district manager disapproves the application, he shall return to the applicant the original so marked, with a letter stating briefly the grounds of disapproval and outlining the appeal procedure.

(c) The district manager shall recommend approval of an application only upon a determination by him that the new commercial motor vehicle will be devoted, without undue delay, to the use or uses directly related and necessary to the war effort or to the maintenance of essential civilian economy, in the business of the applicant and within the area, as indicated in the application. In mak-

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If the labor of cleaning oil and grease from garage floors and drive-ways with solvents, brushes, and caustics makes your back feel as though you could never straighten up, it's time you tried SOL-SPEEDI-DRI.

You can spread SOL-SPEEDI-DRI around all working areas and then forget it. With no more effort on your part, this remarkable absorbent will soak up all the oil and grease. When you sweep up with a stiff broom, your floors will look like new.

SOL-SPEEDI-DRI has many uses around the shop. Stops slipping accidents, for it's completely non-skid. Makes your garage clean and tidy. Used correctly it prevents the tracking of oil and grease across the floors and into cars. Tumble your greasy tools into a pan of it, and they'll come out clean.

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*Midwest & South*—Waverly Petroleum Products Co., Philadelphia 6, Pa.
*West Coast*—Waverly Petroleum Products Co., Russ Bldg., San Francisco 4, Calif.

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OIL AND GREASE ABSORBENT

A COMPLETE Wayne Built LINE.. NOT ASSEMBLED UNITS...
1/4 to 10 H. P.
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ing a determination, the district manager shall be governed by the "*Usage Classification List for New Commercial Motor Vehicles*" as reproduced in Appendix 1 to General Order ODT 44, or as it may be amended from time to time; shall consider the number of available new commercial motor vehicles of the type covered by the application; and shall be assured:

(1) That the applicant could not fill its needs by leasing available vehicles of others, by pooling its present vehicles with those of other operators, by purchasing a used vehicle, or by utilizing the services of other operators; and

(2) That the applicant could not transfer some of its present vehicles now being used for less essential purposes to the use for which it is now requesting the new vehicle; and

(3) That if the new vehicle is to be used for replacement, the vehicle to be replaced is incapable of being repaired to serve the applicant's purpose.

(d) In any case where it appears that the new commercial motor vehicle covered by the application is to be used in connection with an extension or inauguration of motor carrier service which requires the prior approval of the ODT, under General Order ODT 3, Revised, as amended, General Order ODT 6A, as amended, or General Order ODT 17, as amended, or which required the issuance of a new or amended certificate of war necessity under General Order ODT 21A, and such prior approval or new or amended certificate of war necessity has not been obtained by the applicant, the district manager shall defer consideration of the application for a reasonable period. If, within a reasonable time, the applicant fails to request such prior approval in accordance with Administrative Order ODT 15, as amended, or fails to apply for such new or amended certificates in accordance with General Order ODT 21A, or, if having made such request, the request has been finally denied, the district manager shall dismiss the application for a certificate of transfer and return the original to the applicant, with a letter stating briefly the reason for the dismissal. The decision of the district manager under this paragraph (d) shall not be subject to the provisions of 503.472 of this order.

This Amendment 2 to Administrative Order ODT 27 became effective December 27, 1944.

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## MPR 571—TRUCK RENTALS

• Maximum rates for the rental, without driver, of passenger-cars, taxi-cabs, trucks, buses, tractors, trailers, semi-trailers, or any combination of these vehicles, were put under a new regulation by OPA recently. . . . Certain rentals with driver, including hearses, funeral cars and school buses, are also subject to the regulation.

This change, effective February 3, 1945, is designed to provide a set of maximum pricing provisions specially adapted to the needs of the commercial motor vehicle rental industry.

Simplification of maximum pricing for the industry is achieved by having a separate, new regulation made applicable specifically to these rentals, instead of having them subject to the longer general services regulation whose provisions are designed for a wide variety of services.

This action was taken after extensive consultation with the industry and with the OPA Truck Rental Industry Advisory Committee and after

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**McCREARY TIRES**

**GIVE MORE MILES AT LESS COST**

**Proven Performance for Twenty-Five Years**

Truck operators find that McCreary Tires deliver more original mileage, permit more recaps and give greater mileage per recap.

**McCREARY TIRE & RUBBER CO.**
**Indiana, Pa.**

a careful study of industry rates and practices.

No change is made in the basic provision controlling these rental rates. They continue frozen to the highest price charged by the lessor during March 1942 for the same or similar service. The latter phrase, however, is more clearly defined.

A new method is established for maximum rental rates that cannot be determined by the March 1942 freeze provision and were not established previously under the other provisions of the services regulation. The lessor computes a price in accordance with his usual pricing methods and reports it to the Transportation and Public Utilities Division of OPA in Washington, D. C. Costs and other factors must be set forth in detail. If within 30 days from the date that a complete price report is received by OPA, the proposed price is not disapproved or modified, it becomes established as the ceiling price. Meanwhile, the service can be furnished on open billing.

Any ceilings which were determined prior to the effective date of this new regulation by provisions of the services regulation other than the basic March 1942 freeze provision, such as use of a competitor's price, an individual adjustment, or a general order, will continue in effect. The new method is for pricing a new service after the effective date of the new regulation; namely, from February 3, 1945, on. However, where a maximum rate has been established by use of a competitor's price, the lessor must file a report with OPA's national office, giving the name and address of the competitor, the date the service was instituted and the price and service.

The new regulation also tightens the exemption formerly existing in the case of rental agreements containing an option on the part of the lessee to purchase the vehicle or vehicles at a stipulated price, from which all or a portion of the rental instalments are deducted. The exemption is now limited to those agreements in which the amount credited toward the purchase price is not less than a specified minimum depreciation occurring during the rental period. Moreover, those exempted are nevertheless subject to the record and reporting provisions of the regulation.

Minimum depreciation is defined as, for each 30-day period, not less than one per cent of the original cost when new in the case of trucks, tractors, trailers, semi-trailers, and buses, and two per cent in the case of passenger automobiles, funeral cars, hearses and taxi-cabs. Upon written request, supported by a satisfactory explanation, OPA may approve different depreciation rates.

Specific provision is made for individual adjustments of ceiling prices, where an adjustment is necessary to permit the continuance of an essential service. A new form has been drawn up for use in making such application. It lists the information to be furnished in support of a higher ceiling.

Records of leases must be kept by lessors. All lessors are required, if they have not done so already, to file with the OPA in Washington, D. C., copies of transient rental rates in effect in March 1942 and on the date this new regulation became effective. Where copies of rental rates previously were filed, a statement is required only giving the date and place of the previous filing. . . . Exempted from this regulation are:

1. Rental or lease of any dump truck used on construction or road maintenance projects.

2. Any transaction which in effect is a sale of a commercial motor vehicle.

3. Transactions in which the United States Government or any of its agencies is the lessor of any commercial motor vehicle.

4. Any service which has been classified by a municipal, state, or federal regulatory body as a for-hire carrier service.

5. Leasing of trucks between carriers, pursuant to direction of the ODT under its Administrative Order ODT 10, General Order ODT 8 and General Order ODT 17.

The new regulation is known as Maximum Price Regulation No. 571—Maximum prices for rental of certain types of motor vehicles.

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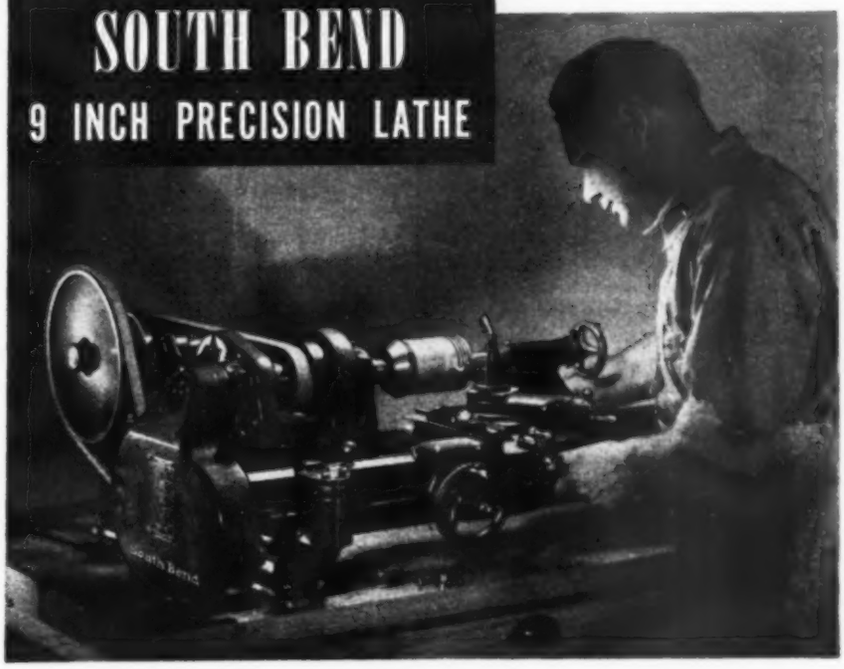
**9 INCH PRECISION LATHE**



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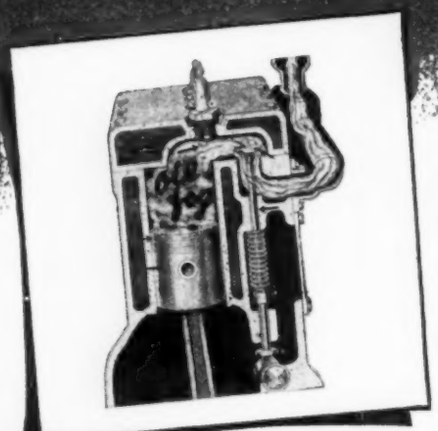

**Keep Valves, Guides, Upper Cylinder, Pistons, Rings**

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***by treating your gasoline with***

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No mechanical system has ever been invented that assures constant, adequate lubrication of valves, guides, upper cylinder, pistons, rings. That is why sticky valves, burned and pitted valve seats, worn rings, and carbon and gum accumulations in upper cylinder are usually the first symptoms of motor trouble. Lubri-Gas Laboratories have developed an exclusive method of chemically processing 40 SAE lubricating oil, so that it enters the combustion chamber, through the carburetor, as an oil fog, and coats all upper cylinder parts with a film of clean oil. The results of this better lubrication are more power, more mileage per gallon, more pep, less wear and repair, freedom from carbon and gum and prevention of overheating and oil pumping. Now when it is so important to keep equipment in operation and out of the repair shop, LUBRI-GAS is indeed a God-send!

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TRADEMARK

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***Cleans and Lubricates as It Powers the Motor***


## 6,000 BUSES FOR POST-WAR

● Six thousand motor coaches, presenting an investment of $90 million, will be ordered by the nation's intercity bus lines as soon as the lifting of wartime priorities permits their manufacture. In addition, a program of rehabilitating all present equipment will provide employment for tens of thousands of automotive workers. These were the findings of the National Association of Motor Bus Operators, as the organization completed a survey of the industry's post-war needs.

"Normally, the country's intercity bus lines require upwards of 2,000 motor coaches a year," sa'd Arthur M. Hill, association president. "Because transportation is vital to the war effort, the manufacture of a limited number of buses has been permitted in the past three years, but far less than the actual requirements were met. Furthermore, these are Victory models that lack the comfort and luxury features that post-war travelers will demand.

"While the intercity bus industry's requirement of 6,000 motor coaches may appear small in comparison with the projected market for passenger-cars," Mr. Hill explained, "it should be remembered that highway buses, with new luxury appointments, will average $15,000 in cost and will require a correspondingly greater number of man-hours for manufacture. Even when the pent-up demand is met, the anticipated post-war travel boom will send requirements for subsequent years above previous levels."

The plans of nearly all bus companies also provide for the complete rebuilding of a major portion of their fleets when manpower and parts are available. This will offer employment for thousands of ex-service men.

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## MOTORCYCLE CEILINGS

● Dollar-and-cent ceiling prices covering all sales of used motorcycles were announced recently by OPA. . . . The ceilings are said to reflect March, 1942, prices, and apply to all sellers —private individuals, dealers and government agencies. Specific prices are listed for some 17 different models covering years 1937 through 1944. . . . Two types of ceilings are in effect—an "as is" price and a "warranty" price. . . . Consult any OPA office if more details are desired.

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## ARMY PARTS SHORTAGE

● A critical shortage of spare parts for the repair of internal combustion engines used in heavy-duty trucks, landing craft and other equipment used in Army and Navy operations, has prompted WPB to establish a special task group to expedite their manufacture and delivery. . . . The group is headed by R. M. Hatfield, Jr., who will assist Harold Boeschenstein, deputy vice-chairman for operations, WPB.

●

## HEADS TRANSPORT DIVISION

● George M. Cornell has been appointed director of WPB's Transportation Equipment Division, it was recently announced. . . . He succeeds Charles B. Bryant, who returns to the Southern Railway System. . . . Mr. Cornell has been with WPB since 1941 and previous to that was with Chesepeake & Ohio Railway Company.


BEAT THE ENEMY DOWN BY KEEPING THE CARS UP, INSTALL ENGINEERED PARTS

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DO-RAY
SAFETY LIGHTING
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Tested by
RECOGNIZED TESTING LABORATORIES
PASSING SPECIFICATIONS OF S.A.E. AND I.E.S.
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CERTIFIED PRODUCT
SAFER LIGHT
SAFER SIGHT
DO-RAY LAMP COMPANY
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## Portable Roads Play Role in Beach Landings

PORTABLE roads or tracks played a vitally important part in the landing of Allied forces on the Normandy beachheads. The metal carpet proper is 10 ft. wide and consists of 3 in. galvanized wire mesh of sufficient strength to support heavy vehicles safely over the soft surfaces of beaches and dunes.

As the Allies moved inland, portable tracks were laid parallel to existing country roads, to prevent congestion of ground vehicles and in some cases serving as landing strips for air cover planes.

Another type of portable track used in the European invasion consists of a pair of parallel duck boards 1½ inches thick forming the wheel tracks for loads up to 10 tons and 2 inch boards for heavier traffic.

## OLD TIRE CERTIFICATES N. G.

• Tire ration certificates dated March 31, 1944 and earlier were invalidated last month by OPA. Very few of them are still unused in the hands of consumers, and this action is not expected to affect very many vehicle operators.

Since the use of these old certificates by tire dealers to replenish stocks had been voided earlier, this action will save a tire dealer from having to accept a tire certificate that he cannot use to replace the tire sold. . . . Any person whose certificate is invalidated by this action can reapply at his local board and re-establish his eligibility, OPA points out.

•

## CONVENTION BAN IS REAL

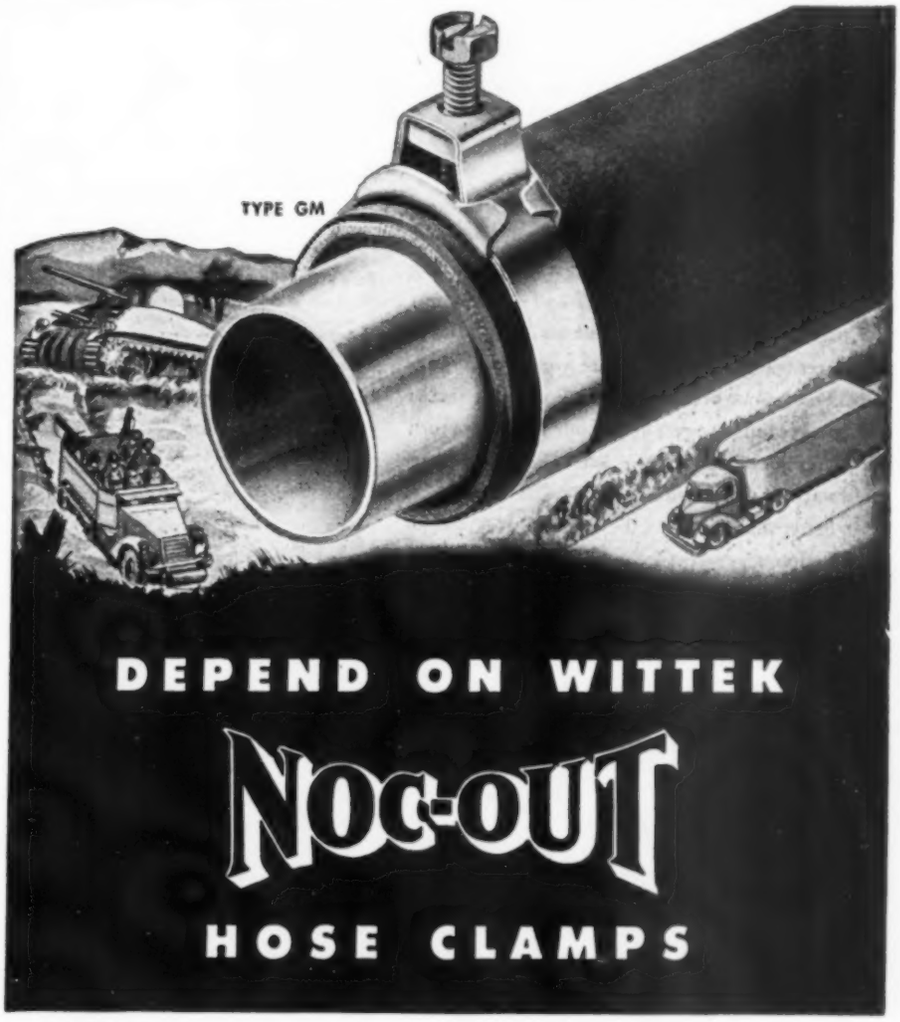
• Col. J. Monroe Johnson was recently appointed to head a committee to receive and pass upon applications for the holding of group meetings which are to be attended by more than 50 persons, to determine if the need for these meetings is sufficiently in the war interest to warrant the use of transportation and service facilities. . . . Only two of the first 110 requests for permission to hold such meetings was approved, according to the first announcement of the committee.

•

## "TEN CENTS PER POUND"

• The prediction that synthetic rubber can be produced "on a peacetime basis" at 10.7 cents per pound, against the pre-war market price of 22 cents for natural rubber, was made recently by Dr. Waldo Semon, director of research for Goodrich.

Dr. Semon made it clear that the 10.7 figure is a post-war estimate, applied to "the most efficient plants only", since the average cost for the government-type synthetic rubber produced thus far has been 34 cents per pound. . . . The anticipated after-war cost estimate represents "out-of-pocket" cost only, without allowing for amortization and profit.



Type A—Adjustable For Replacement.

The standard of the industry. Quick-tightening, perfect leak-proof hose connections, for original equipment and replacement. For Radiator, Heater, Booster Brakes and High Pressure hose connections. Wittek Manufacturing Co., 4305-15 W. 24th Place, Chicago, Ill.

Type HP—For High Pressure Requirements.

WITTEK WMCO NOC-OUT HOSE CLAMPS

A DEFECT in the smallest ignition part will halt a mighty truck or bus. Play safe by insisting on top quality replacement parts and Fuel Pumps and parts. Kem Komet replacements are pre-fitted on master gauges that duplicate your own equipment. This unique precision-fitting keeps your trucks and buses rolling longer; helps your mechanics turn out better jobs in less time. The Kem Komet pre-fitted starting, lighting and ignition line is complete, often better than the parts they replace. Heavy-duty construction gives you extra value per part—plus margins of quality in insulation, wiring, welding, machining and oversizes. Leading jobbers stock Kem Komet pre-fitted replacement parts and Fuel Pumps and parts everywhere.

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**SILVER ANNIVERSARY**

KEM celebrates a quarter century of service to industry.


## TIRE MANPOWER NEEDED

● Paul V. McNutt, chairman of WMC, announced last month that there is an immediate critical need for approximately 2,300 workers in the top-urgent military tire production program, and that an additional 8,500 workers will be needed during the next few months, as production facilities are expanded. . . . To meet these needs, a top priority rating on labor is being accorded the tire industry.

●

## VETERANS HAVE 90 DAYS

● National Headquarters of Selective Service recently announced that it has informed state directors that honorably-discharged veterans separated from service prior to December 8, 1944, but not more than 90 days before, are entitled to take advantage of the time extension provided by the recent amendment to the Selective Training and Service Act, for reinstatement in their former positions.

●

## GAS ALLOCATION DOWN

● The PAW last month announced the allocation of 1,144,000 barrels of automotive gasoline daily for U. S. civilian vehicles during the first quarter of 1945. . . . This is a decrease of 29,000 barrels daily, as compared with allocations for the fourth quarter of 1944, and represents the seasonal decline in the use of automotive gasoline. . . . It is calculated to permit a continuance of the present consumer ration.

●

## "INDIVIDUAL" TRUCK TUBES

● The use of butyl type synthetic rubber is now permitted in civilian truck inner tubes, in cross-sectional sizes from 7.00 to 9.00 inclusive.

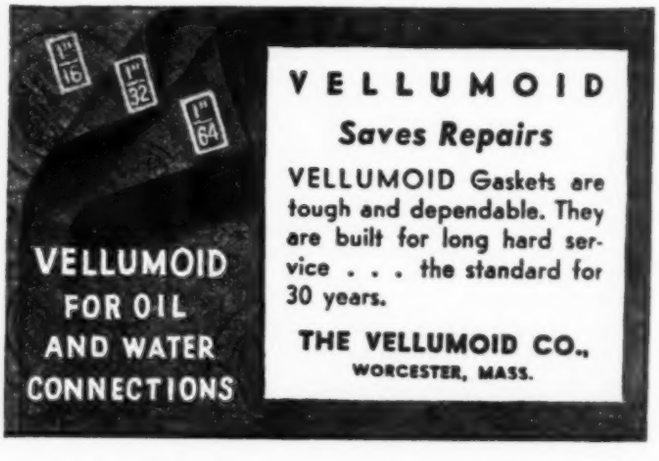
The tire industry has agreed to eliminate group size markings for truck inner tubes. Henceforth, all truck tubes will be marked with individual sizes, according to Goodrich factory officials. . . . For example, tubes will be marked "11.00-20", instead of MT-20.

## West Va. Has "Clothing-Store-on-Wheels"

IF YOU think you've seen everything, you should take a look at the clothing store on wheels, a completely equipped motorized shop which travels the coal fields of Logan, McDowell and Wyoming counties in West Virginia. Operated by a mining company for the benefit of its employees, the store serves approximately 6,000 families in 20 towns.

Bearing the name of "Fashions to Your Door" the unit visits each of the communities, all located within a 65-mile radius of the company headquarters, for two or three days of each month. Employees may purchase custom-tailored clothing or be fitted with ready-to-wear styles.

The store is housed in a large 6-wheel truck and carries a standard line.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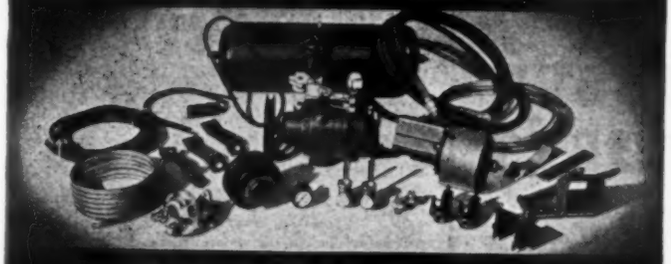
VELLUMOID
Saves Repairs
VELLUMOID Gaskets are tough and dependable. They are built for long hard service . . . the standard for 30 years.
THE VELLUMOID CO.,
WORCESTER, MASS.

*Write for Bulletin* KU-50
WAGNER AIR BRAKES
THE AIR BRAKE WITH THE ROTARY COMPRESSOR



Wagner Electric Corporation
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6400 Plymouth Avenue, St. Louis 14, Mo., U. S. A.

## Faster Pictures Show How Mechanisms Work

DEVELOPMENT of motion picture cameras which, operating at 20,000 frames per second, will reveal how mechanisms actually work, is an essential engineering need, Richard Painter and Paul Huber, of General Motors Proving Ground, Milford, Mich., told the SAE at its recent Annual Meeting in Detroit.

They said the human eye can follow motions only up to three or four cycles per second, and that it has become necessary not only to see mechanisms operate at high speed, but to see any given action at any time.

"We believe," they said, "that high-speed photography will prove to be an extremely important tool in the hands of any imaginative engineer who is frequently faced with problems which can be answered if he has knowledge of how a mechanism works."

## NEW ANTI-FREEZE ORDERS

• Anti-freeze production is now governed by new orders of WPB. . . . Revised estimates for 1945 have placed 40 million gallons into anti-freeze requirements for 1945. . . . The present government stockpile of alcohol is approximately 75 million gallons. . . . WPB's new orders control all types of alcohols, including ethyl alcohol, methyl alcohol, isopropyl alcohol and the glycols.

•

## HOW TO SHIP HORSES, DOGS

• Owners of race horses and racing dogs may ship their animals anywhere in the United States by railroad or common and contract motor carriers, by filing an affidavit with the transportation company that the particular movement is not for racing purposes, ODT Director Johnson announced recently. . . . The movement of such animals to points outside the United States will require a special permit, obtainable from the ICC.

•

## CIVILIAN GAS YIELD DOWN

• United Nations' military requirements for petroleum products have reduced the yield of civilian automotive gasoline from a 42-gallon barrel of crude oil by more than 44 percent—18 gallons to 10 gallons—since Pearl Harbor, PAW recently announced. . . . This, however, has resulted in a stepped-up production of such fuels as 100-octane aviation gasoline, toluene, butadiene and fuel oils.

•

## NEW GAS ALLOCATION

• Distribution among the various classes of transport facilities of the automotive gasoline allocation for the first quarter of 1945 was announced recently by ODT. It amounts to 986,000 barrels daily, for all forms of domestic transportation. . . . ODT's claims were met by PAW in full, except for the East Coast and West Coast districts; the former was short 9,000 barrels daily; the latter 2,000 barrels daily.

KEEP VITAL TRANSPORTATION IN SERVICE

PROTECTIVE motor maintenance is the constant practice of men responsible for the efficiency, long-life and economical operation of vital transportation. *They never relax their fight against sludge, gum, acid and corrosion.*

It's simplicity itself — for **LOOSITE** safely and economically rids the entire lubrication system of dangerous petroleum residues. Then **SILOO**, added to fresh crankcase oil, functions *continuously* — preventing further accumulations. Engines — gasoline or diesel — operate at maximum efficiency, oil reaches every vital part—thus costly layups and repairs are avoided . . . engine life prolonged.

You're miles and dollars ahead when you use **LOOSITE** and **SILOO**. Your dealer or jobber has them.

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*Solvents For All Types of Petroleum Residues*
General Offices: 331 Madison Ave., New York 17, N. Y.

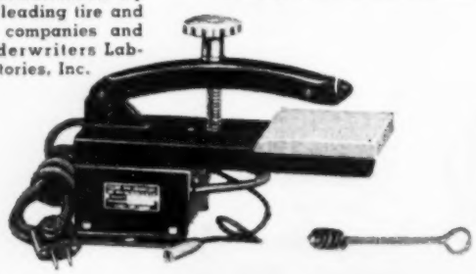
*For sale by leading jobbers everywhere, and the White Motor Company branches and distributors.*

# HERE'S THE BEST WAY TO REPAIR *Synthetic* RUBBER TUBES

Synthetic rubber has less tear resistance and less adhesive quality than natural rubber. Ordinary tube repairs will not bind and seal the injury securely. Unless the injury is prepared carefully and vulcanized properly, the stretching and flexing of the tube in service will quickly cause the injury to tear further and spread beyond the repair.

Dillectric completely answers this problem. This simple, quick, low-cost method will safety-sure your tube repair jobs by blocking the injury from further tearing, completely filling and reinforcing the tear, and vulcanizing the repair safe and permament. It's the best way to repair *both* synthetic and natural rubber tubes. Write, today, for complete information.

Approved and Recommended by all leading tire and oil companies and Underwriters Laboratories, Inc.



INSTRUCTION MANUAL *Free* ON REQUEST

**DILLECTRIC**
REG. U. S. PAT. OFF.
*Electrically* VULCANIZED TUBE REPAIRS

Write, now, for the Dillectric Instruction Manual which pictures and describes in detail the proper preparation and vulcanization of synthetic tubes.

**THE DILL MANUFACTURING COMPANY**
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## BROWN LEAVES PAW

● The resignation of Assistant Deputy Petroleum Administrator Bruce K. Brown, was announced last month. . . . Mr. Brown returns to the Standard Oil Company of Indiana, as general manager of research and development, with headquarters in Chicago.

●

## BEARING SUPPLY EASED

● The supply situation in anti-friction bearings is now easier than some months ago, though some of the larger sizes are still tight, a WPB spokesman told members of the WPB Anti-Friction Bearings Labor Advisory Committee at a recent meeting.

●

## 180 CANCEL CONVENTIONS

● Further cancellation of scheduled conventions at the request of ODT, in order to conserve wartime transportation facilities, has increased the number of organizations taking such action during 1944, to 180, Director Johnson announced last month. . . . All cities have been urged by ODT, to officially ban any conventions requiring inter-city travel.

## Trend Toward Wider Rims Seen in New Manual

THE "Bible" of tire and rim size combinations which, for many years has represented the approved standards for the automotive industry, as published by the Tire and Rim Association, Inc., is now being distributed. This 1945 Manual incorporates many important deletions in respect to permissible size combinations between truck tire and truck rim, listed as permissible combinations in former years.

These changes in the permissible standard truck rim sizes clearly indicate the trend toward the use of wider rim bases to improve tire life and the stability of the vehicle itself. It would appear that the combined judgment of the tire, wheel and rim manufacturers had developed the conclusion that a ratio of 70% of rim width to tire cross sectional size produces the most desirable results with the present design of tire and rim.

Although wide base rims for passenger cars were incorporated in the original design by such manufacturers as Studebaker and Buick in 1942, the new combinations of size ratios for trucks had not at that time been developed to the point where the use of wider rims had been accepted as standard practice by truck manufacturers.

Early in 1940, the National Wheel and Rim Association, an organization of after-market service distributors, undertook to introduce the use of wide base rims on motor trucks by dealing directly with truck operators and tire dealers. The effort of this trade association was supported, just before the United States entered the war, by an advertising program in many of the principal trade papers and by a di-


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**TEN WHEELERS**
for 1½ to 5 Ton Trucks

Greater tonnage . . . more profit. Increase carrying capacity up to 20 tons. Extend frame to any desired length. Load kept in perfect balance . . . no teeter or end-sway. Simple, sturdy, no intricate parts. Timken bearings; steel castings hydraulic brakes. Easily installed in 3 hours. 3 sizes. *LOW COST. No priority rating required.*

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*Write for Circulars, Low Prices*

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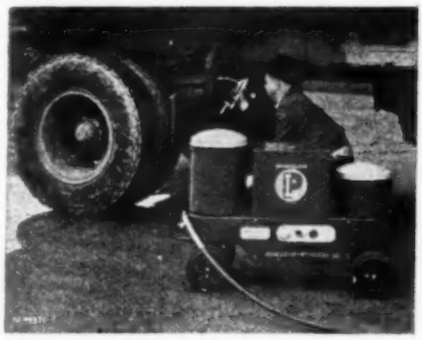
# "PRESSURELUBE" GREASING UNIT



● *The Only Completely-Portable, Self-Contained, Battery-Operated Grease-Gun Equipment*

## EXCLUSIVE FEATURES:

1. **Self-Powered**—Either with battery or gasoline engine, eliminating the need for air-hose or electric cord.

2. **Grease Pressure**—Adjustable from 1,000 to 12,000 lbs. per sq. inch.

3. **All-Purpose**—Will dispense all lubricants, from the lightest to the heaviest, even in sub-zero weather.

4. **Portability**—Allows the gun to be wheeled directly to the vehicle to be lubricated, without removing the load.

IF you now possess a pre-war PRESSURELUBE outfit, we are here to help you keep it running, with a full stock of service parts for all models. . . . We are also prepared to handle repairs—from light service to complete reconditioning, at our modern factory.

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rect-mail campaign to truck operators and tire dealers nationally.

The 1945 Manual of standard size combinations, as published, would seem to indicate that the wide base rim program for trucks now enjoys industry approval as standard practice. This change in the standards will have the effect of eliminating many size combinations which were formerly permissible under the standards prevailing in previous years. In some instances, under the new standards, an individual size of truck tire can only be mounted on one rim size. The Standard Truck Tire Warranty, as published by the Rubber Manufacturers Association in 1943, automatically voids the guarantee if a truck tire is mounted on a rim size not recommended in the table of standards as published by the Tire and Rim Association.

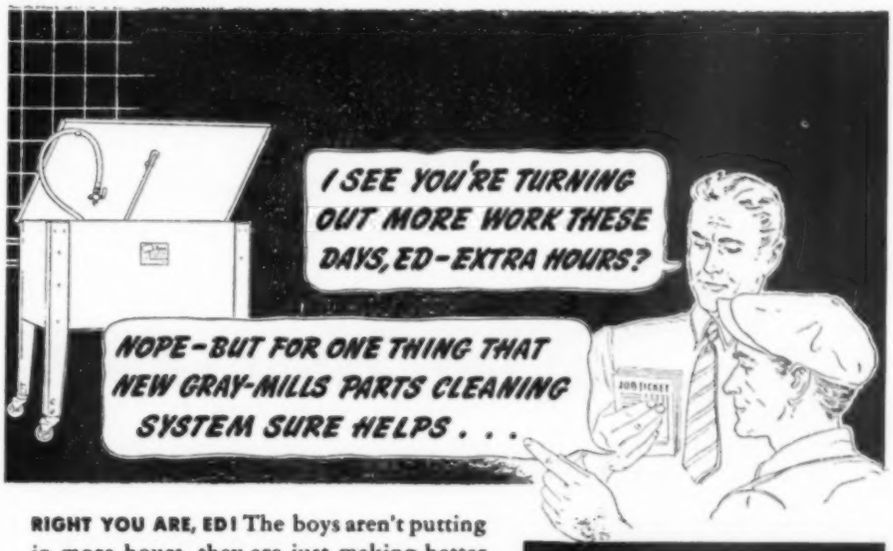
The changes in size standards, particularly in relation to truck rim widths, now presents a set of conditions under which many motor trucks now in use have tires mounted on rims of a size which contradicts and violates the current standard as used on the vehicles being presently produced in the truck manufacturing program for essential uses.

The National Wheel and Rim Association, by direct activity with the truck operator, is making every effort to convert the off-standard combinations of tires and rims now in use on motor trucks to conform to the new standard. This conversion program on existing vehicles is being accomplished without sacrifice of material in many cases, because wheels and rims removed from some vehicles may be suitable for use on others.

●

### Federal Dealers Discuss Post-War Plans

THE representatives of more than 20 Federal Truck dealer organizations in the New England states met in Boston recently, to discuss current and post-war marketing problems. . . . Carl Loud, Federal sales manager sponsored and directed the meeting.



I SEE YOU'RE TURNING OUT MORE WORK THESE DAYS, ED - EXTRA HOURS?
NOPE - BUT FOR ONE THING THAT NEW GRAY-MILLS PARTS CLEANING SYSTEM SURE HELPS . . .

**RIGHT YOU ARE, ED!** The boys aren't putting in more hours, they are just making better use of the hours they do work by using that new Gray-Mills Parts Cleaning System.

It enables any mechanic to spend more time on profitable repair work and less time on cleaning parts. The new Gray-Mills System works 3 ways, using cold solvent for quick, safe cleaning of large and small parts. 1—For soak-cleaning the Air-gitator provides a boiling action of the solvent which speeds grease and grime removal. 2—Small parts can be easily swished clean by hand in the Swisher Basket. 3—Hose-cleaning of larger parts by means of a powerful gear-type pump and adjustable high or low pressure nozzle. Don't waste valuable hours cleaning parts the old "bucket-n-brush" way. Do it better and faster with the Gray-Mills Parts Cleaner. Order one—it will pay for itself. GRAY-MILLS CO. 1935 RIDGE AVE., EVANSTON, ILLINOIS.

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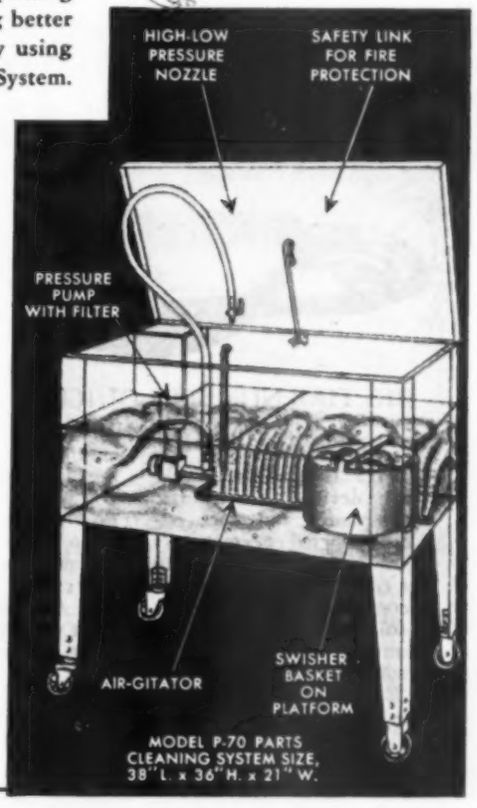
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## *Gasoline Concentrate*

IMPROVES MOTOR PERFORMANCE ★ REDUCES MAINTENANCE COST

★Four ounces of Gibraltar Gasoline Concentrate added to each ten gallons of gasoline will solve the problem of overhead lubrication. It deposits a protective film over the combustion chamber which seasons the metal, reduces friction on the valve surfaces and prevents carbon from adhering to them.

Gibraltar Gasoline Concentrate is processed from a light mineral oil base under a secret formula. It will prolong the life of any gasoline motor, give added power and efficiency and increase gasoline mileage. Write for details.

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HOOD REFINING CO.

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GREENSBURG, PA.


## TIRE PICTURE STILL BAD

• "Most critical of all war items" is the way WPB refers to tires nowadays, as tires are being chewed up in Europe at an unbelievable rate, the Red Ball Express, for example, having used as many as 5,000 tires per day.

As you know, WPB is expanding tire factory facilities to produce over a million more truck and bus tires per quarter for military and essential civilian use, with the ultimate goal set at 6,700,000 tires per quarter; but that will not produce the necessary tires *today*, and the situation is aggravated by the continuing manpower shortage.

Early forecasts for the first quarter were as follows, subject of course to change by changing military events:

*Large Size Truck Tires*: 5% to 10% fewer than in the last quarter of 1944 for civilian use.

*Small Size Truck Tires*: About 25% fewer tires will be available.

*Passenger-Car Tires*: Slightly fewer will be available monthly in the first quarter than in the last months of 1944.

The above sad picture is due principally to military demands. Plenty of camelback will be available and recapping will still be your best bet. So, recap in time and practice tire conservation methods as strictly as ever in your fleet.


# EVERHOT BRANDERS NOW AVAILABLE!

BIG TIRE NUMBERS, QUICKLY BRANDED, SAVE TIME, TEMPER and TIRES!

THIS is the tire marking device used by tire companies and fleet operators to *permanently* number every tire with a code number that won't come off . . . A heavy-duty tool that brands *any* set of numbers . . . It will last for many years.

AFTER the war is won, you will no doubt want to go right on keeping very close check on tire cost and mileage . . . And your Everhot Tire Brander will still be one of your most valuable tire tools... That, plus the Everhot Tire Record System.

WRITE FOR ILLUSTRATED CIRCULAR
WE ANSWER PROMPTLY
WE CAN SHIP QUICKLY

Everhot MFG. COMPANY
MAYWOOD, ILL.

# P-M TIRE
# EZ-OFF

**For Demounting Heavy Duty Tires**
**SAVES EFFORT AND TIME**

• TAKE IT EASY-er! Apply P-M Tire Ez-Off between bead and rim. It quickly penetrates, dissolves rust and corrosion and creates a metallic lubricant. Casings ease off with a minimum of hammering and prying. You save energy, time, tires and rims.

P-M Tire Ez-Off also makes rim rings, lugs, studs and other "frozen" metal parts easier to remove. Ask your Tire, Automotive or Hardware Jobber—*today*.

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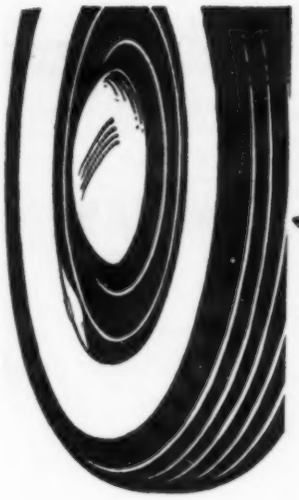
Los Angeles 15, Calif., U.S.A.



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**Trucks Buses Passenger Cars**

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*Factory:*
**MID-WESTERN AUTO PARTS**
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GENUINE ALMETAL PRODUCTS

***MR. TRUCK OWNER:***

ALMETAL JOBBERS CAN SOLVE YOUR UNIVERSAL JOINT AND DRIVE SHAFT PROBLEMS. CONSULT THEM FOR HELPFUL ASSISTANCE.

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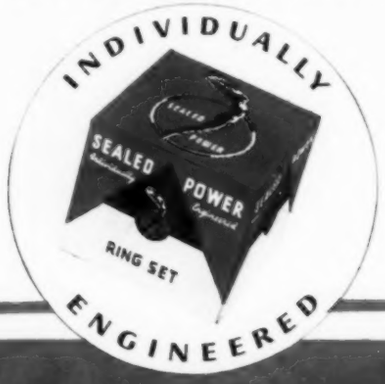


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